THE

PARENTS' CABINET

Amusement and Instruction

BY

MARTHA HILL AND FRIENDS



A NEW EDITION. EDITED BY

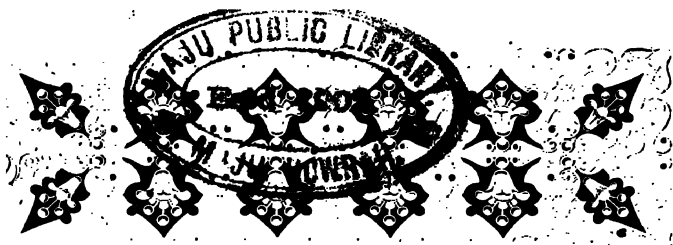
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NIGHT-WATCHES.

I WAS only four years old when my mother died, and seven when I was sent away to a boarding-school, for I was an only girl, with no kind aunts to take care of me and no girls of my own age to play with; so my father thought it best for me to go away to school. Of course, as soon as I began to go to a boarding-school, I thought myself too old and too grand to be under the nurse's authority, and usually did what was right in my own eyes, during the holidays. This will explain how it was that I was able to do what I am going to tell you about now. I think you are all too wise to wish to do such foolish things as I did.

I had so few playfellows at home that I spent a great deal of my time reading all the stories I could find, and when I had read a new one I used to tell it

to Ted, the brother next to me in age. This habit soon made me a good story-teller, and when the girls at school found this out they made me tell them a story every night before we fell asleep, and sometimes we used to stay awake very late, hearing and telling stories. I cannot tell you when I first began to think I should like to sit up all night; but I think some of the many stories I read must have put the fancy into my head, and once I proposed to the girls in our room that we should tell stories all night long. They laughed at me, and said I never could do it, and that such a little girl as I was, only nine years old, would be sure to fall asleep before twelve o'clock. But I thought I could, and I teased my great friend Lizzie Norton into promising that some night she would try to stay awake with me. Lizzie was nearly two years older than I was; but she was very sweet tempered, and I could generally persuade her to do anything I wanted, and I talked her into really wishing to find out how it would feel to pass a whole night awake. We were sure that people must feel quite different in the small hours of darkness from what they did in the daytime; that we should feel like grown-up people, grander and older, besides being able to boast of having been up all night.

A good opportunity for trying our experiment came to us at this time. A cousin of mine invited Lizzie and me to spend Easter week at his house, and when

we found that we were to sleep together we both felt that now was our time, and agreed to try our experiment the very first night. When we found ourselves shut into our nice large bed-room at ten o'clock, we began by almost a quarrel. I wanted to sit up, to remain dressed, to walk about, read and do everything just as if it were daytime. But Lizzie would not hear of this. She was sure we should take cold, and make ourselves ill, or else we should make a noise, and some one would come and see what was the matter, and "catch" us. She insisted that we must undress and go to bed, and remain there, and said if I would not agree to this she should go to sleep at once. This was an awful threat, for eager as I was about it, I did not like the idea of sitting up alone; so, very sulkily, I gave in, and for nearly half an hour I would not speak a word to Lizzie. But I dared not be sulky when we got into bed for fear she should go to sleep, though, indeed, we had talked ourselves into such an excited state that even had we wished I think we could not have slept just then. First we read in bed as long as our candle lasted, and then we talked, and then I told stories—all the stories I could think of, old and new—until my voice grew hoarse with continual speaking, and Lizzie began to breathe so softly and regularly that I knew she was falling asleep. I shook her indignantly, and insisted on her getting out of bed and walking up and down to rouse herself, getting

up with her to see that she carried out my commands, and then we crept back together, cold and cross, but no longer sleepy. And so the hours wore away, slowly and painfully; at least, I should have said "painfully," had any grown-up person made me stay awake; but I would not allow to myself that I was a foolish child, and even cruel to my dear Lizzie.

As six o'clock struck we both declared it time to get up; we dressed, and waited impatiently for sounds of life in the quiet house. At seven I said it was time to go downstairs, and marched into the drawing-room with my work and book as if it had been nine, only to be greeted by cross looks from the housemaid, whose broom soon caused me to beat a retreat. I felt jaded, cross, and excited, but at the same time very triumphant, for I had done what I had said I would do, and I knew what people felt like when they sat up all night. But I did not like to go back to my room. I felt horribly tired of it, and so I crept upstairs to the nursery to play with the children and beg some bread from nurse. I am afraid, as soon as I was out of the way, Lizzie fell asleep and "broke the charm," as I called it; for when I went to call her to breakfast, I found her lying on the bed, with closed eyes, and she did not seem to hear me speaking at first; but then Lizzie was not a philosopher, and only tried experiments to please me, and not from the love of experiments.

That day was Good Friday, and I shall never forget how sleepy we were in church, and how miserable I felt as I tried to keep awake, nor how ashamed of myself when I saw my cousin looking at me as I recovered myself from a great *nod* forward; but the service was over at last, a good night's rest made us feel all right again, and I had the lasting pleasure of thinking I had carried out my plan.

And yet I had not carried out the whole of my plan. We had "staid awake"; but we had not "sat up," and I was determined to do both, and that before long. But I decided that Lizzie was not the sort of girl to help me, and that I had better wait till I went home for the holidays, and then get one of my brothers to join me. I was nine years old, my brother Ted was just eight, and he would be ready to do all I told him without a question. So I waited for the summer holidays.

The first thing after my return home, or, at least, the first time I had a quiet talk with Ted, I told him of my grand project, and found him very ready to take his share of the adventure. We agreed that it would be best to wait for ironing day; for after the great wash was over, the servants used to iron the clothes in the sunny front kitchen, a bright, cosy room, though it was underground, where, now and then, to my great delight, I was allowed to iron the pocket-handkerchiefs. And the clothes being ironed, they were hung

on great tall clothes-horses round the fire, horses which reached up to the white ceiling, making a snug little room within the larger room, the large sheets and table-cloths making the smooth white walls. Before they went to bed at night the servants would make up an immense fire with a large lump or "cob" of coal, as we all called it in Lancashire, in the centre, and slack, or small coal, piled upon it and around, and then damped with water. This made it smoulder all night long, with no flame, and a dull black top; but between the wide bars there was glowing red heat, which made the little room formed by the clothes-horses one of the warmest, cosiest places I have ever known, and in this place we determined to pass our night of watching.

We agreed that, after being put to bed, we should get up and dress, and I should tell stories to Ted quietly in my room till the rest of the household had all gone to their rooms and might be supposed to be asleep. We had no loving mother to miss us, when she came to give us the last kiss and tuck us up in bed, and so this plan succeeded. We heard the maids go up to their room, and some half-hour later—and what a long half-hour it seemed to us waiting in the dark—Papa went to his room, and we heard the key turn in the lock of his door just before he got into bed. Very soon after that we crept gently down, down to the cellar kitchen, calling in the dining-room on the way

to get story-books. We had soon placed a little table and two chairs in our little room inside the clothes-horses, and we felt that never had children a nicer house than we had. Soon we became hungry and, after a little puzzled discussion, decided that it would be right for me to go into the pantry, and cut some bread and butter. And yet we were not so sure of the lawfulness of this proceeding, but that I was careful to remove all traces of what we had been doing; for we had a very cross old cook-housekeeper, who was inclined to think that children were always in the wrong, and if we ventured to interfere with anything on her premises, she made us feel not only the sharpness of her tongue, but sometimes the weight of her hand.

So the loaf was put carefully back into the bread-pan, the butter on its dish, and the knife, after being washed and wiped, into the knife-drawer. Then we had our supper, and then we toasted some bread ready for a second supper, which was to come off an hour or two later. Then we read, and then we played at some games, and poor Ted got so sleepy that I had to shake him and scold him, and, I am afraid, I even pinched him to rouse him. How I longed for daylight! And yet daylight came so early in those long June days that even when it had come there would be many hours to be got through before our usual time for getting up would come.

But when the sun at last shone on the tops of the houses on the opposite side of the broad street, a good thought came into my head. We would go out for a walk. I had heard people say that the best thing after a sleepless night was a walk in the fresh morning air; it would be the best thing for us, it would do us good, it would keep us awake, and it would pass away the time. But I knew it would not do for us to go out just yet, for the morning mist had not cleared away, and it seemed so raw and cold, that Ted, who was not very strong, might take cold. And yet it would not do to wait too long, for our town was full of factories, and a little before six o'clock the streets would grow noisy with the pattering sound of the wooden clogs of the mill hands, who would all be going to their work, and who might speak rudely to us. For most of the workers in the cotton factories are young girls, who have had few opportunities of learning civility, and, like most Lancashire people, they are used to speak out all they think, without stopping to consider whether their thoughts are kind and pleasant. When you pass them, they look at your face, and your dress and your manner, and tell you in a loud voice what they think of you, or call out to a companion, "Eh! but yon 's a gradely (nice) lass!" or, perhaps, "Eh! but she 's ugly!" or, "Eh! but she 's a stuck-up thing!" always beginning each sentence with the broad Lancashire "Eh!" I did not

like meeting these girls at any time, even when the streets were full of other people, and I fancied it would be much worse if we two children were the only people to be laughed at, the only creatures not "factory folk" in all the crowded street. Our house being in the High Street, and some distance from any cross street, we could not avoid meeting them, if we went out about six o'clock, so we must go for our walk before six—nay, we must be home again before there should be a chance of our meeting the very earliest of the factory girls.

I think we all know that children's ideas are a little vague as to the time needed to go any distance. I meant that we should take papa's favourite walk, a round of three miles, through the fields, and decided that we must start at four o'clock. I crept cautiously upstairs for bonnet and cloak, and then dressed Ted, who was so delighted with the idea of going out when everybody but ourselves was asleep, that I could hardly keep him quiet. Then we had a hunt for the key of the kitchen door. At first we could not find it, and began to think we should be obliged to give up our walk, but suddenly Ted remembered that when the servants went to church, they used to lock the kitchen doors and hang the keys in the corner by the old clock, before letting themselves out by the front door; so we looked by the clock, and there was the key. Mounting a chair made me tall enough to draw back the heavy bolt,

while Ted undid the chain, then I turned the key and opened the door. When we were both outside, I locked it again and put the great heavy key in my pocket, feeling very important. We crept up the area steps, and pushed the iron gate back. It creaked so that we feared it must waken all the world, and we stood a moment, trembling and looking fearfully up at the windows, lest we should have been heard. But no one was to be seen at the windows, and not daring to push the gate again, we squeezed ourselves through the small opening already made and were safe in the street.

It was just four o'clock. Everything was still, and I remember thinking the tall brick houses, with their closely drawn blinds, were like dead people, and feeling for a moment a little frightened at our being alone in such a silent world. We walked soberly, hand-in-hand, down the old-fashioned Watergate, and along a quiet side street into the fields. You will perhaps wonder that we were not stopped by some watchful policeman, but this happened long ago, when policemen were not very plentiful anywhere, and our town had only three, though it was a large crowded manufacturing town. We met no one.

As soon as we were in the fields we felt free, and lost the awe-struck feeling that the deserted streets gave us. We ran races, jumped across the hollows caused by the sinking of the earth in the coal-pits

deep under ground, and talked and laughed merrily. But the sight of the first coal-pit sobered me, for it reminded me of a danger unthought of before. Round the town there lived a great many colliers, and some of the men worked all night, fresh gangs taking their places very early in the morning. We might meet some of these men! As I thought of this, I felt inclined to run home at once, for they were much worse than mill-girls. Their black clothes, pale faces, and bleared eyes, all the result of their trying work in the narrow dusty mines, made them look frightful to me, and I imagined they might do anything to us. And yet I could not bear to turn back. I thought I would rather go a long way round to avoid the collieries; and where we were obliged to pass a pit-mouth, for there was scarcely a field without one, we would creep behind fences and walls. We did so, and in this way we went on until we were almost a mile from home.

We had just crossed a wide pasture, which was bounded by a high stone wall, when, through the stile in the wall, we saw coming towards us a party of colliers—two men, two boys, and a girl, all black with coal-dust, their eyes very red, and their teeth very white, and in their hands their miners' lamps swinging. What could we do? It was of no use to run away; they would be sure to run after us and equally sure to catch us. I quickly made up my mind that we must walk boldly forward,

as if we were doing what was quite usual, and never take any notice of them. I took Ted's hand in mine and marched on, past them, and right up to the stile, but I saw the party hesitate, then stop, and evidently begin to talk about us.

No sooner were we on the other side of the wall than, calling on Ted to run with all his might, I turned sharp round on my left along the wall, and fled as if for my life, tearing over the rough ground, and dragging poor Ted after me. I knew I could get home by another path in this direction, if only I could get away from the colliers. I do not think they troubled themselves much about us. They were coming from their work, tired out and longing to get home, and beyond a few words of wonder as to who we were, and how we came there, I do not suppose they bestowed a thought upon us. Certainly, they did not follow us, and we had all the rest of the way quietly to ourselves; but I was frightened and ran on, panting and out of breath, till once more we were safe back in the warm kitchen.

This adventure quite wakened us up, and we managed to amuse ourselves happily till six. Then we crept back to my room, to leave the kitchen clear for the servants.

You will be able to imagine how sleepy and tired we were all the next day; but it was holiday time, and there was nothing much to do. Ted spent most

of the day sleeping on the sofa, and I fancy I had several naps over my book. But the thought that my plan had succeeded helped to make me forget my fatigue.

You will think that by this time I must have had enough of sitting up all night. But no. The secrecy of the whole proceeding had a charm for me, which I can hardly explain, and when my little brother Tom, who was not yet seven, came to complain to me that it was not fair to let Ted do things I would not let him do, and that he would like to sit up with me all night, and have fun in the kitchen, I very soon agreed to let him do so, provided he would wait for next ironing day. That was a fortnight off, and I was much afraid lest either of the two boys should tell what we had been doing, and meant to do, and bound them to secrecy by solemn promises and awful threats of not playing with them ever again if they were tell-tales. It was hard work for both of them to keep silence, especially when old Ann, the housekeeper, said something about someone meddling with her bread-pan, and added "she wondered who it could be, for whoever it was, had left the lid on the floor, and let the bread get dry." Once I had to put my hand over Tom's mouth, and hurry him out of the kitchen, where we had been watching some dough cakes baking, because he asked me, quite out loud, "if it wouldn't be fun to make cakes when we sat up?" But Ann

did not notice what he said, and the night came round without anyone suspecting our plan.

We managed everything just as we had done before, and our little house between the clothes-horses seemed snugger than ever. I was bolder, too, this time, and hunted up a pot of jam from the larder, to make a feast with, and we made a hearty supper of toast and jam and water. But as the night wore on, poor little Tom grew so sleepy, he could not be made to keep awake by any means, but laid his curly light head upon the white flag, and snored a duet with the crickets on the hearth. This made me feel very lonely. The whole house was quiet; everyone asleep. The voice of the watchman every hour was the only thing to break the stillness, and I grew impatient of the gloom and quiet. First, I climbed on to the dresser and drew up the blind, thinking I should then see the earliest streak of dawn; and then I thought I must have light at once, so I seized the great heavy iron poker, and struck at the huge lump of coal in the heart of the fire, until it was broken into a hundred pieces, and a hundred tiny flames sprang from it, lighting up the kitchen with pretty flashing lights, which shone on every dish-cover and saucepan that hung against the walls, and brightened every nook and cranny of the room. This delighted me, and I felt I should not mind sitting up alone in such a cheerful light, even if Tom did not wake till morning.

But I had forgotten all about the drawn-up blind, and you will all be able to fancy what I felt as I lay basking before the fire, when I heard a rapid step come to the area railings, then go off and return accompanied by another step, and then heard a voice call out, "What's the matter? What are you doing there?"

I slowly got up from the floor, climbed on to the dresser, and drew down the blind. Two men were standing by the rails. They consulted together, and then one came down the steps and tapped at the window.

"Tell me what you are doing there."

"It is no business of yours," answered I. "Go away."

"I shan't go away till I have roused the house," said the man. "I shall ring your folks up;" and he went up the steps again.

"Tom, Tom!" cried I, "wake up! Come to bed—come upstairs!" and I half carried, half dragged, the poor little lad upstairs—up, and up, and up, until we reached my room, laid him on my bed, covered him up, and then crept in by his side, all dressed as I was.

A loud knock on the street door had come as we ran upstairs; another and yet another followed, and soon we heard Ann come out of her room and go down; then we could hear the sound of voices for

some ten minutes in the hall. then the door shut, bolts drawn, and Ann's heavy step returning up the stairs. My heart beat louder and louder as she came nearer and nearer, for I knew she would scold me severely before she went to her bed again. And she did, and ended by saying that I was the naughtiest girl that ever lived, and that she would tell my papa all about me next morning. I cannot remember if I slept. I think I must have been too much alarmed at what papa might say to do so. He was very kind, but I was so much away from home that I was a little shy with him, and dreaded above all things the way in which he would sometimes make fun of me when I had done anything foolish. What would he say now? I felt I deserved to be scolded as well as laughed at, for I had not only done a foolish thing, but I had meddled with food which I had no right to do, and I had let Ted and Tom do what might have really harmed them. I felt entirely repentant, and the whole thing looked very different, when I thought of dear papa's grave face, from what it had done at first when we children talked the scheme over.

When breakfast-time came I went down most unwillingly to pour out my father's coffee, but nothing was said then; and as the meal came to an end I hoped he might have forgotten about the disturbed night, and that Ann would relent and say nothing. But, no! papa told me to fetch him a book from the dining-room,

and while I was looking for it, I heard her come up-stairs from the kitchen and go into the breakfast-room, and then begin a long account of all the naughty things I had ever done in my life. Sins of all kinds were laid at my door, and as I listened to the dismal catalogue, I began to think papa would never speak to me again.

At last it came to an end, and I heard papa say a few words in a very quiet voice. Soon after that Ann left the room. I stood behind the dining-room door with papa's book in my hand, thinking I could never, never go near him again, and vaguely meditating running away, or shutting myself in my own room for days, or doing something or other to make papa sorry for me, when I heard him call me. I had always been obedient, and I felt I must go when he called; and in I went, trembling and miserable. As I came in papa turned round and looked at me with a funny smile, and said, "Why, Annie, you little goose! how could you do such a foolish thing as to sit up all night?" I had no answer to his question; but as I looked at his kind face, all the trouble in my heart passed away. I only felt what a foolish child I had been, and what a dear papa I had. And this was the last of my Night Watches.

POMPEII.

"FATHER, I want to speak to you," said Oliver. "Do answer me one question. Is it true that whole cities have been found buried under heaps of stones thrown out by Mount Vesuvius?"

"Yes, Oliver, quite true," replied his father; "two cities have been discovered buried in that manner."

"Then, if you please, Father, do tell me how it happened; for I could hardly believe Gregory Jones, when he showed me this morning, at the British Museum, a piece of the lava, or stone, which, he said, had been brought from Herculaneum, one of the buried cities."

"What Gregory told you is quite true; and as I have an hour's leisure, I will tell you something of the terrible event. You know where the volcano called 'Vesuvius' is situated?"

"Yes," said Richard; "in the south of Italy, about six miles to the east of Naples."

"Everybody knows now that this volcano is dangerous from the eruptions of fire, burning stones, melted lava, and cinders that it pours forth from time to time. But at the time that Herculaneum and Pompeii were destroyed this same mountain had never been known to have an eruption of fire. The very first account of one that can be relied upon as true is that of the eruption which, about eighteen hundred years ago, suddenly buried those two cities full of inhabitants, who, as far as we can judge, had no time to escape."

"What!" said Arthur; "were the people burned in their houses?"

"No, not exactly burned," said his father; "rather, I believe, suffocated by the sulphurous vapour that came from the mountain. Several skeletons have been found."

"What did you say were the names of these unfortunate cities, Father?" asked Arthur.

"Herculaneum and Pompeii," replied his father. "They were both situated within five miles of the volcano, and were so completely buried that until only a hundred years ago they remained undiscovered. Herculaneum was buried the deepest; being now about twenty-four feet under ground. This city was covered by the liquid lava, which ran down that side of the mountain towards which Herculaneum was situated."

"What! can that hard, stony lava ever have been liquid?" said Oliver.

"When it first bursts from the volcano it is liquid, but is as thick as honey, and in appearance red hot," replied his father.

"How dreadfully hot it must be!" exclaimed Arthur.

"But when cold," continued his father, "it is solid as stone; and it is as hard to dig as a quarry of stone. The lava destroyed Herculaneum, but Pompeii was buried under heaps of pumice-stones and cinders. The ruins of Pompeii are not more than twelve feet, and in some parts only two feet, below the surface of the ground."

"That city, then, was easily uncovered," said Oliver.

"It is a curious fact," replied his father, "that Herculaneum, the city which was buried the deepest, and by the hardest material, should have been the first discovered. Some men digging a well, after having worked to a certain depth, found, to their surprise, part of a town; and means were immediately taken to remove more of the lava. A very small part of the city, however, has been dug out, owing to the hardness of the lava. Pompeii being covered with matter as soft as gravel, when once discovered was more easily unburied. A large part of that city is now to be seen —whole streets of houses without their roofs, which in all cases have fallen in, but with the interiors often

highly ornamented by vases, statues, and paintings on the walls. Furniture, glass vessels, and other articles have been found, not at all injured—in fact, just as the families used them eighteen hundred years ago, previous to the destruction of the city."

"How curious!" said Richard; "I suppose the things found have been taken care of?"

"Yes, and preserved as curiosities. You may see some of them in the British Museum. But you will be still more interested at the Crystal Palace, at Sydenham, where there is a Pompeian house complete in every respect; it has been formed from the plans of undestroyed parts of buildings in Pompeii. The paintings and decorations, too, are copies of originals found in the destroyed cities, often in a wonderfully fresh state. You must pay it a visit. Among other rooms you will see the dining-room, called the Triclinium. There you will a find a table, surrounded by three couches—the Pompeians and other Roman people did not sit at table as we do, but reclined on couches, resting the left arm on a cushion while they ate; and after dinner they lay on their backs for repose. Nine people could dine at these three couches—three on each couch. The right-hand couch was the seat of honour. When the guests reclined on the couches they took off their shoes; and both before they began to eat and during the dinner-time water was poured over their hands into basins of gold or silver."

"But, Father, can you tell us how the storm began?" asked Richard; "I wonder how anyone could live so near to such a terrible volcano!"

"You must remember," said his father, "that the people who dwelt in those cities fancied themselves to be in perfect safety—they feared no danger. For, as I have said, the eruption that destroyed them proceeded from a mountain at that time not supposed to be a volcano. The whole neighbourhood of this mountain was much frequented and thickly inhabited on account of its fertility and the beauty of the scenery. Country houses, with gardens, extended even up the slopes of the mountain. Strangers from other parts of Italy were perpetually coming to Campania, as this part of Italy was then called, for health and pleasure. But, although the Romans, who inhabited these cities, had never been alarmed by eruptions from the neighbouring mountain, they had suffered from earthquakes. Sixteen years before the great eruption which buried them, a large part of Pompeii and Herculaneum had been thrown down by the shock of an earthquake."

"And the people continued to live there!" exclaimed Arthur; "how foolish!"

"Not only lived there," replied his father, "but rebuilt the houses thrown down. The inhabitants of these cities were living in peace and security, and quite unprepared for so dreadful an event, when,

on the 24th day of August, 79, the eruption took place."

"That must have been in the reign of the Emperor Titus," said Richard.

"Yes," said his father; "and the celebrated Pliny the Younger happened to be an eye-witness of the eruption. He was then a lad of seventeen, living at Misenum, in the bay of Naples, about six miles from the city of Naples."

"How far was Pompeii from Naples?" asked Oliver.

"Thirteen miles," replied his father. "Pliny was living with his mother and his uncle Pliny, and was engaged in his studies. His uncle had the command of a fleet of galleys at that time stationed at Misenum.

"Now, Richard, read this most interesting account left to us by Pliny the Younger; read it slowly, so that we may all understand it."

Richard took the book, and read the following passage:—

"On the 24th of August, about one in the afternoon, my mother desired my uncle to observe a cloud which appeared of a very unusual size and shape. He immediately arose, and went to a rising ground, from whence he might view more distinctly this very uncommon appearance. I cannot give a more exact description of its form than by comparing

it to that of a pine-tree, for it shot up to a great height, in the form of a trunk, and extended itself at the top into spreading branches. It appeared sometimes bright, sometimes dark, and spotted, according as it was more or less filled with earth and cinders.

"This extraordinary appearance excited my uncle's curiosity, and he ordered a light vessel to be got ready, and gave me the liberty, if I thought proper, to go with him. I rather chose to continue my studies.

"As he was coming out of the house, he received a letter from Rectina, a Roman lady, who lived in a country house, situated at the foot of Mount Vesuvius, and who was in the utmost alarm at the great danger which threatened her. She had no way to escape but by sea, and she earnestly prayed him to come to her assistance. He ordered the galleys to be put to sea, and went himself on board, intending to assist, not only Rectina, but several others; for the country houses stand thick upon that beautiful coast.

"When hastening to the place from which others fled with the utmost terror, he steered his course direct to the point of danger, and with so much calmness and presence of mind, as to be able to make, and dictate to others, his observations upon the changing aspects of that terrible scene.

"He approached so near to the mountain, that the cinders, which became thicker and hotter the nearer he approached, fell into the galleys, together with

pumice-stones and black pieces of burning rock. The galleys were in danger, not only from the vast fragments which rolled down from the mountain, and obstructed all the shore, but also from the sudden retreat of the sea.

"Here he stopped to consider whether he should return back, as the pilot advised him. 'Fortune,' said he, 'befriends the brave. Carry me to the house of Pomponianus.'

"Pomponianus was then at Stâbiæ (in the Gulf of Naples), and had already sent his luggage on board a galley; for though he was not at that time in actual danger, yet being within view of it, and, indeed, extremely near, he was determined if it should increase, to put to sea as soon as the wind should change. The wind was favourable for carrying my uncle to his friend, whom he found in the greatest alarm. My uncle embraced him, and urged him to keep up his courage. He then ordered, with an air of unconcern, the baths to be prepared, and, having bathed, sat down to supper.

"In the meantime, the eruption from Vesuvius flamed out with great violence, and the darkness of the night rendered it still more visible and dreadful. After supper, my uncle, who did not believe in any immediate cause for alarm, retired to rest, and fell into a deep sleep.

"The court which led to his room being now

almost filled with stones and cinders, had he continued there any longer, it would have been impossible for him to make his way out. He was awakened. He got up, and went to Pomponianus, and the rest of the company. They consulted together, whether it would be more prudent to trust to the houses, which now shook from side to side with frequent and violent concussions, or to fly into the open fields, where the burning stones and cinders fell in large showers, and threatened destruction. In this distress, they resolved for the fields, as the less dangerous situation of the two.

"They went out, therefore, having pillows tied upon their heads with napkins; and this was their whole defence against the storm of stones that fell around. It was now day everywhere else, but there a deeper darkness prevailed than in the darkest night. Torches and various kinds of lights were carried by those who fled.

"My uncle and the others went to the shore, to observe if they might put out to sea with safety; but they found this impossible, the waves being so boisterous. My uncle having drunk a draught of cold water, overcome with fatigue, threw himself down upon a cloth, which was laid for him. But he was soon obliged to rise by the flames and a strong smell of sulphur, which also dispersed the remainder of the company. He raised himself up with the assistance

of two servants, but almost immediately fell down dead, suffocated by the gross and noxious vapour!"

"How terrible!" said all the boys.

"The darkness," said their father, "that Pliny here speaks of lasted three days, at the end of which time the dead body of his uncle was found, exactly in the same posture in which he had fallen, and looking more like a man asleep than one dead. Having given this account of the death of his uncle, Pliny goes on to relate the continuance of the storm. I will read it to you:—

"During all this time my mother and I were at Misenum. I continued to pursue the studies which prevented my going with my uncle till it was time to bathe. After which I went to supper, and from thence to bed, where my sleep was much disturbed. For many days before, there had been shocks of an earthquake, but that night they were so violent as to shake everything about us, and seemed to threaten total destruction. My mother flew to my chamber, where she found me rising, in order to awaken *her*. We went into a small court belonging to the house, which separated the sea from the building. I took up Livy, and amused myself looking over the pages, as if we were in safety. While we were here, a friend of my uncle's, who was just come from Spain to pay him a visit, joined us, and, seeing me sitting by my mother, with a book in my hand, he greatly blamed her calmness,

and reproved me for my careless security. I was then but seventeen years of age.

"Though it was now morning, the light was exceedingly faint. But, as all the buildings tottered around us, we resolved to quit the town.

"The people pressed about us in great crowds. Having got to a distance from the buildings, we stood still in the midst of a most dangerous and dreadful scene. The chariots which we had ordered to be drawn out were so agitated backwards and fowards, though upon level ground, that we could not keep them steady. The sea seemed to roll back upon itself, and to be driven from its banks by the trembling movement of the earth. The shore had distinctly advanced, and many marine animals were left high and dry upon the sands. On the other side, a black cloud, bursting with fiery vapour, darted out a long train of fire, resembling flashes of lightning, but much larger. Upon this our Spanish friend said to us, with great earnestness, 'If your uncle is safe, he certainly wishes you may be so too; why, then, do you delay your escape a moment?' We replied, that while we were *uncertain of his safety*, we could not think of our own. Hereupon our friend left us, and fled with the utmost speed.

"Soon afterwards the clouds seemed to descend, and cover the whole ocean. My mother strongly urged me to make my escape at any rate, which, as I was

young, I might easily do. As for herself, she said, her age and corpulency rendered all attempts of that sort impossible; and she would willingly meet death if she could have the satisfaction of seeing that she was not the occasion of mine. But I absolutely refused to leave her, and taking her by the hand, I led her on. She complied with great reluctance, and not without many reproaches to herself, for retarding my flight. The ashes now began to fall upon us. I turned my head, and observed behind us a thick smoke, which came rolling after us like a torrent. I proposed, while we had yet any light, to turn out of the high road, lest we should be pressed to death in the dark by the crowd that followed us. We had scarce stepped out of the path when darkness overspread us, not like that of a cloudy night, but of a room when it is shut up, and all the lights put out.

"Nothing then was to be heard, but the shrieks of women, the screams of children, and the cries of men; some calling for their children, others for their parents, others for their husbands, and none able to recognize one another but by their voices.

"At length a glimmering light appeared, which was not the return of day, but only the forerunner of an approaching burst of flames. Fortunately the fire fell at a distance from us: then again we were immersed in thick darkness, and a heavy shower of ashes rained upon us, which we were obliged every now and

then to shake off, otherwise we should have been crushed, and buried in the heap.

"At last this dreadful darkness gradually disappeared, like a cloud of smoke. The real day returned, though very faintly. Every object that presented itself to our weakened eyes, seemed changed, being covered over with white ashes, as with a deep snow. We returned to Misenum, where we refreshed ourselves as well as we could, and passed an anxious night, between hope and fear, for the earthquake still continued."

"Father," said Oliver, "do not shut the book; pray put a mark in the place, that I may read it again by and by."

"Is it supposed that many of the people escaped from Pompeii?" asked Richard.

"Some few may have done so," said his father; "but many were unable to escape. The shower of burning stones and cinders of which Pliny thus speaks, and to escape which he and his neighbours fled from Misenum, buried Pompeii.

"The storm appears to have lasted three days and three nights," said Richard.

"Yes, so Pliny states, and at the end of that time not a trace of Pompeii was to be seen. Such of the inhabitants as were not able to escape by flight were buried with the city."

"Have many skeletons been found," asked Oliver, "in the houses that have been uncovered?"

"In one house," replied his father, "the skeleton of a man was found who had apparently been vainly trying to escape by the window. It would seem as though he had waited, hoping that the unusual storm would abate, until the burning matter from the volcano had half filled the street, and then it was too late to escape by the door. It is supposed that he was killed by the stifling vapours."

"Foolish man to have waited so long!" cried Arthur. "How frightful the street must have looked full of red-hot stones!"

"Yes; it must have been a horrible sight. Near to this skeleton a few coins, a plate, and a silver saucepan were found.

"The situation of the prison has also been ascertained by the discovery of skeletons with shackles or chains still attached to the leg bones. It would appear that, in the general confusion, the prisoners had been left to perish."

"That was cruel," said Arthur, "at such a time not to give the prisoners a chance of escape."

"The most terrible proof," continued his father, "that has yet been found of the suddenness of the storm is the skeletons of a whole family, who lived in a country house in the outskirts of the city. The house was so placed between the mountain and the city that it must have been one of the first to feel the effects of the eruption. If it had been mentioned in

any history that the mountain had ever before thrown out fire and burning stones—if the inhabitants of this house, as well as those of the city, could have suspected what was coming—they would most probably have abandoned their houses and property, and fled in time. But the waiting to see what was likely to happen made it useless afterwards to attempt to escape."

"Why did they wait?" said Arthur. "I am sure nothing could have persuaded me to stop in such a dreadful storm."

"Remember how it arose, Arthur. According to Pliny's account, the air was still and the smoke from the volcano rose up straight, until the atmosphere could bear it no higher, when it spread on all sides, presenting the appearance of the branches of an enormous pine-tree. This at first was evidently an object more of curiosity than fear. The next morning a cloud descended upon the land and adjoining sea. It is supposed that the shower of burning cinders then fell most heavily on Pompeii; and that those inhabitants who had survived the stifling vapours which had killed so many, and amongst them Pliny's uncle, could not have lived long after the shower began.

"It has been supposed that it was at the commencement of this shower that the wretched owner of the country house endeavoured to make his escape, with such property as he could carry, hastily gathered to-

gether. On the outside of the house, at the entrance of a garden leading towards the sea, two skeletons were found; one (presumed to be that of the master of the house) with the key of the garden-gate in his hand, and with many gold and silver coins near him; and near the other, supposed to be his servant, were some silver vases, which he had probably been carrying for his master.

"When the vaults or cellars of the house were dug out, the skeletons of the remainder of the family were discovered. They were found, seventeen in all, huddled up together, at the foot of a staircase leading from the cellars, having remained in this position for eighteen hundred years. These were the skeletons of young women and children: and some of the light-coloured hair of the children, together with many rings of gold, and various jewels were found with them.

"They were covered with fine ashes, several feet in depth. These ashes had evidently drifted through the vent-holes of the vaults, and by degrees had covered the unfortunate family."

"But why were they in the vault?" asked Arthur.

"It has been supposed," said his father, "that they had fled into the cellar for safety, when the shower of hot stones and cinders first began; and, from the remains of food found in the vault, that they had taken provisions with them, hoping to await in security the conclusion of the storm. That hope was vain! The

strength of the walls, and the narrowness of the openings, protected them from the falling stones and cinders; but the stifling heat was not to be kept out by such means. The air, charged with burning dust and sulphureous vapour, was suffocating. In their despair, they seem all to have rushed to the staircase to make their escape, but the door being blocked up with ashes, they perished.

"How sudden the fatal calamity was that overwhelmed the city, you may imagine, when I tell you that in the forum a new altar of white marble, apparently just out of the hands of the sculptor, had been erected. An enclosure was being built all round—the mortar just dashed against the sides of the wall, was but half spread out; you might see the long sliding stroke of the trowel about to return to spread and smooth the mortar. But it never did return—the hand of the workman was suddenly stopped; and although so many years have passed, the whole looks so fresh and new that you would declare the mason was only gone to his dinner, and was about to come back and smooth the roughness.

"In another house a sink was found, in which were fish-bones and other remains of food. And at a shop, which must have belonged to a baker, some flour was found in the kneading trough. In this house, the mill, the oven, and the vessels for holding water, flour, and leaven, have been uncovered."

"How odd, to have the mill in the house!" exclaimed Oliver.

"Did the Roman bakers grind their own corn?" asked Richard.

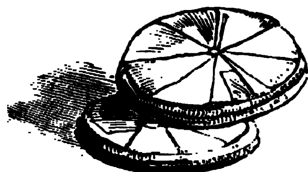
"I suppose so, as stone mills for grinding corn have been found in the bakers' shops," replied his father.

"How were these mills worked?" asked Richard.

"Most probably by the slaves. Among the Romans, the labour of grinding was also given as a punishment to those who had been guilty of any crime. This labour was considered very severe drudgery; and the criminals were forced to work in chains."

"Has any bread been found in the shops?" asked Arthur.

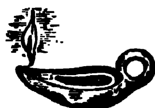
"Yes," replied his father. "Here is a drawing of some bread that has been found in Pompeii. But all such things decay very soon, when exposed to the fresh air. It is a curious fact, that bread, and dried fruits——"



"What!" interrupted Oliver, "have fruits been found that have not decayed in more than eighteen hundred years?"

"Yes. A street has been dug out," said his father, "which, from the quantity of raisins, figs, plums,

chesnuts, and many other sorts of fruit found in the houses, preserved in glass bottles, has been called 'the street of dried fruits.' These fruits would no doubt make but a sorry dessert now, but it can still be seen that they are fruit, and the different kinds can be distinguished. Many glass bottles, drinking-cups, and vases, and even small panes of window-glass, have been found; also copper scales and moulds for shaping cakes and bread, and various other utensils fit for kitchen and household use, that are now carefully preserved as curiosities. See, here is a lamp and a jug."





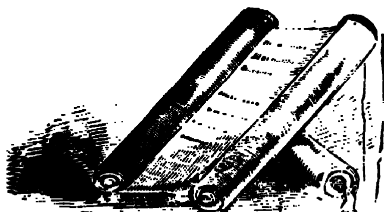
"The jugs are much the same in shape as those we use now," said Richard; "I suppose our work-people have copied from these."

"Yes," replied his father; "the shapes of many Roman jugs and lamps are very pleasing, and we have taken patterns from them."

"Stop, Father, before you close the book; what is this print?" cried Oliver.

"That is a roll of papyrus, upon which the Romans and other ancient nations used to write," said his father. "On the banks of the Nile, the large river of Egypt, grows a rush called papyrus, which served the purpose of paper before paper was invented. The

stalk of this rush consists of many folds or layers. These layers were carefully separated and pasted together, so that each piece or roll for writing upon was of the thickness of two layers, one set of layers being placed crossways over another; and the surface was then polished with a shell or hard smooth stone. You may see beautiful papyrus plants in the Kew Gardens."



"What sort of a pen was used?" asked Richard.

"A reed cut to a point," answered his father. "The ink was either made from the cuttle-fish or from charcoal, and could easily be washed out with a sponge."

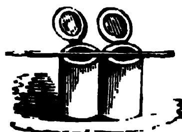
"But why is the papyrus rolled up at each side?" asked Oliver.

"The writing was in narrow columns; and when the manuscript was read, it was opened in the form you see in this print, one column only being unrolled at a time."

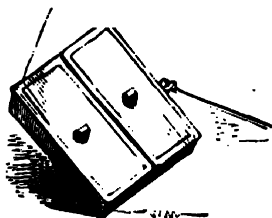
"How large were the sheets of the papyrus?" asked Richard.

"They were about sixteen inches in length, and each roll had a label fixed to it, much the same as the label

we put on the backs of our books, to distinguish them from one another. Here is a print of the inkstand



and reed-pen. But besides the papyrus, the Romans used vellum or parchment to write upon. They also had what they called *tabellæ*, a kind of little wooden book. The sides, as you see, have a knob of wood in the middle to prevent the wax with which they were covered from



touching when the tabellæ were closed. The instrument used for writing in these tabellæ was called a *stylus*—it was made of iron and pointed. When the writing on the tabellæ was no longer wanted, the marks of the stylus were removed, and the waxen surface made smooth, so that the tabellæ could be used over and over again.

"In the Temple of Isis in Pompeii the remains of two priests were found. They appeared to have been at dinner; for the apartment containing the skeleton of one of them was strewed with egg-shells, chicken-bones, and earthen vases. The continuance of so extraordinary a storm must have alarmed them when it was too late; for the other priest, it would seem, attempted to escape by breaking open a part of the wall. He was most probably killed by the stifling air;

and his skeleton, with the axe beside it, lies close to the wall. Within the temple many skeletons, all supposed to be those of priests, were found."

"How extraordinary that they should have remained, and been able to eat in the midst of such danger!" said Richard.

"Probably they placed a vain confidence in the power of their goddess, and therefore were unwilling to quit her protection, until the quantity of burning ashes increased so greatly that the temple was surrounded, and all escape prevented."

"What a terrible history!" said Oliver; "it makes me wonder how anybody can live near so dreadful a thing as a volcano."

"The Italian people still live near it," replied his father, "although the mountain has never since been long without an eruption."

"You told us about Herculaneum; but how were the ruins of Pompeii first discovered?" asked Richard.

"It is not exactly known; but for a considerable time before the excavations were regularly begun, the country people had often dug up pieces of marble that had been shaped by hand, and had discovered a part of the outer wall of the city."

"And how much has now been dug out?" asked Arthur.

"A great number of private houses, besides many small shops, two theatres, the public baths, the forum,

and some other public buildings, together with the walls that surrounded the city. The amphitheatre has also been uncovered. This is the place where the Roman people, men and women, assembled to witness their cruel and disgusting games, in which wild beasts were introduced to fight with one another, and with men, and also men to fight with men. These combats were the more revolting because the gladiators (for that was the name given to these fighting men, from the Latin word *gladius*, a sword) were compelled to fight, and were not permitted to leave off till one had caught his opponent in a net, and plunged his three-pronged weapon into him. The death of one of the combatants always took place."

"I think it would have served the spectators right if the wild beasts had broken loose among them," said Oliver.

"This actually did happen," replied his father, "on one occasion at Rome. Some enraged elephants broke through the barriers which separated them from the spectators; and to prevent the recurrence of such an accident, an alteration was made in the building. The place appropriated for the fight was an oval in the very centre of the circus, or amphitheatre, and was called *arena*, which means 'sand,' from the sand with which it was sprinkled to absorb the blood that might be shed. After the accident which I have mentioned, this arena was sunk twelve or fifteen feet below the

lowest range of seats; it was fenced besides, and strong nets were placed over the fencing. Inconvenience and annoyance were also felt at times from the gladiators, who, as may be supposed, were a bold and desperate race. Their weapons and their courage were not always used against one another. In the reign of the Emperor Probus, it is mentioned that about eighty of the gladiators, having determined not to shed their own blood for the amusement of a cruel people, killed their keepers, broke out from the place of their confinement, and filled the streets of Rome with blood and terror. It was not till after an obstinate resistance that they were cut to pieces by the regular soldiers."

"What is the form of an amphitheatre?" asked Oliver.

"It is an oval building, the arena being in the centre, and the seats arranged all round, the rows of seats rising higher and higher as their distance from the arena increases. It is supposed that the wild beasts were kept in dens around the arena, and that they were let out by doors opening into it as they were wanted.

"To screen the spectators from the heat of the sun, the top of the building was covered by an immense awning, called *velum*. The stretching of this awning was a work of great labour and skill. In boisterous weather it could not be used."

"Did the spectators then sit without shelter?" asked Arthur.

"No," said his father; "on those occasions the Romans made use of broad-brimmed hats, and a sort of umbrella. Richard can tell us what that word is derived from."

"*Umbra* (shade)," said Richard.

"So fond were the Romans of those cruel sights, that the people would sometimes go in crowds before daylight, and some even the night before, to secure favourable seats.

"Workmen are still employed at Pompeii in uncovering the buried city. The houses are small, and have a gloomy appearance, being without windows in the lower parts, and with very small windows for the upper rooms. Indeed, the sleeping-rooms were often built without windows and without chimneys. The dwelling-houses, although often highly decorated, had but few of the comforts of our dwelling-houses. The streets are narrow, and have footpaths on each side; and stepping-stones for foot-passengers are placed across the carriage-way. Fountains are very numerous throughout the city."

"And has Mount Vesuvius really had many eruptions since?" asked Oliver.

"Yes, several," said his father. "Among others, one described by Dr. Clarke, the traveller, who visited Naples in the year 1793. He saw an eruption of the

volcano, and had the courage to go up the mountain at the very time."

"Why did he do that? How dangerous!" cried Oliver.

"He wanted," replied his father, "to observe the appearance of the lava on its first flowing out of the volcano."

"And did he succeed?" said Richard.

"Not at first, owing to the suffocating vapours thrown out; and he was also obliged to retreat on account of the immense fragments of rock which were falling in all directions, and which would have crushed any person that had been in the way. After much difficulty, however, Dr. Clarke and his friends were able to reach a chasm through which the lava had opened itself a passage out of the mountain."

"Then he saw the very place where the lava comes out?" said Oliver.

"Yes; he found one of the sources, and beheld the wonderful sight of a flood of clear liquid lava flowing as rapidly as a torrent, and glowing with all the splendour of the sun. Upon this mass of lava he tried several experiments, and threw in stones of various weights which had been cast up from the volcano. Stones that weighed only five, ten, or fifteen pounds, made little or no impression; but the stones of sixty, seventy, or eighty pounds, were seen to form a kind of bed on the surface of the lava, and float away upon it.

Dr. Clarke contrived to roll a stone of three hundred pounds weight that had been thrown out from the crater and lay near, into the current of liquid lava. This stone gradually sank beneath the surface and disappeared. 'If,' says Dr. Clarke, 'I wished to describe the manner in which it acted on the lava, I should say it was like a loaf of bread thrown into a bowl of very thick honey,—the loaf sinking gradually till it finally settles at the bottom.' As this stream of lava flows on, it becomes of a darker colour; and as it cools, becomes harder and harder.

"But here is a further description by Dr. Clarke of the volcano, which, at the time of his writing, had been pouring out lava without interruption for several days. I will read his own words to you:—

"'The flow of lava, which was last night so great, this evening suddenly stopped. But the crater assumed such beautiful columns of light red flame as I think I never saw before. Millions of red-hot stones were shot into the air and fell again, all bending in the form of a fine arch. The lava could be seen boiling and bubbling up above the crater's edge, and sometimes falling over it. I could perceive it splash upon the cone, and take its course gently down the side of the mountain. Sometimes, and more usually, it fell again into the crater. I write this with the burning mountain before my eyes: all the top of the cone is covered

with red-hot stones and lava. The clouds of smoke, tinged with the boiling matter within, are like burnished gold, and as bright as fire.'

"Since this eruption the appearance of the mountain has been very much altered. An eruption took place in October, 1822, when the whole mass within the crater was blown out together, with a large part of the cone itself, so as to leave an irregular gulf about three miles round, of which the depth has been supposed to be from 1,000 to 2,000 feet. More than 800 feet of the cone were carried away, so that the mountain was reduced in height from about 4,200 to 3,400 feet. Since then there have been other eruptions, but I do not know that they have materially altered the form or height of the mountain, although they destroyed trees, buildings, and other property."

"There is one thing which still surprises me," said Richard; "that nobody should have endeavoured to uncover Pompeii soon after it was buried."

"It is supposed," replied his father, "that when the eruption which buried Pompeii ceased, some attempts were made to clear away the cinders. The volcano having had many eruptions since the year 79, each succeeding eruption has added a fresh layer of cinders over Pompeii. In digging through these different layers of pumice-stones and cinders the first or lowest layer was found to have been disturbed; and it is pro-

bable, therefore, that some of the inhabitants who had escaped, returned when the storm was over to search for their property; but that the labour being greater than what they found was worth, Pompeii was left to its fate."

NOTHING WASTED.

"GEORGE," said Mr. Harmer, early one spring morning, "I am going to breakfast with my friend Mr. Franklin, who lives near Covent Garden: should you like to go with me?"

"Oh, yes, Papa, I should like it exceedingly," replied George.

"Then put on your hat and gloves as quickly as you can, for we must be at Mr. Franklin's before eight, and it is now twenty minutes to seven."

George quickly obeyed, for he liked walking with his father, because he was always sure to see and hear something amusing. He was soon ready, and he and his father started on their walk.

It was a fine clear morning, and the sky appeared of a deep blue over the thousand chimneys of busy London. At this early hour few fires had been lighted, and there was little smoke to dim the bright sky.

"How pleasant and fresh it feels, Papa," exclaimed George; "I am glad I have come with you. But the streets do not look so lively as in the middle of the day. A great many of the shops are still closed, and those that are opened do not look half so gay, with the windows nearly empty, and the shopmen dusting and sweeping. I do not think," continued George, laughing, "that I should like to be employed getting shops ready for customers. Oh! I see something I should like to do. Look, Papa, at that boy in the stationer's shop; he has a kind of watering-pot in his hand with a hole at the bottom, through which the water trickles. See, the boy is making a figure of eight on the ground. Do stop one moment, Papa; I should like to do that very much."

Mr. Harmer stopped at George's request, to watch the boy.

"Papa, what is he doing that for?"

"To lay the dust in the shop, just as the water-carts are used for watering the roads."

"Papa, what is that foolish woman looking in the dust-heap for? I am sure she can find nothing worth having there."

"Do not be quite so sure, George," replied his father. "There are many things that are made use of from the dust and sweepings of the various houses in London. That industrious woman finds it, no doubt, well worth her while to search over these heaps."

"Why, Papa, she is only picking up little pieces of cord that can be of no use to anyone, and she is even stuffing those bits of rag and paper into her apron. What can she do with them?"

"She will probably take the cord, pieces of rag and paper to a rag-merchant, who will, in his turn, sell them to a paper-maker," replied Mr. Harmer. "The cord will be used for making mill-boards and brown paper. Rag, I thought you knew, George, is employed for making writing-paper."

"Yes, I know, Papa, that writing-paper is made of rags, after they have been well soaked and beaten in great vats till they are quite a pulp; but I did not know that such dirty little pieces of rag as those could be of any use."

"The paper-makers can turn the worst coloured rags," replied Mr. Harmer, "into paper of the most beautiful white; but the cleanest rags, of course, require less labour, and are therefore of greater value.

"There is more reason now, George, than ever for saving bits of rag and string and even old pieces of paper, because we are no longer able to buy rags from the Continent with which to make our paper. The nations of Europe can now make paper for themselves, which formerly they were unable to do, and therefore will not sell us their rags. Many substances are now used for making paper that were not thought good enough when we had plenty of rags.

A kind of rush called Esparta, that grows in Spain, is largely used here, and makes a very fair kind of paper. Straw is also largely used for inferior papers, such as newspapers, but it does not make such a strong paper as Esparta."

"I know that newspapers tear very easily," said George, "for I packed up some books in one the other day to take to school, and the paper burst, and all the books fell out."

"There is another mode of making paper," continued Mr. Harmer, "and that is from the fibre of the jute plant (which grows in India). This fibre is used for several different purposes. It is made into string, and can even be woven into socks. The coarser parts of the fibre serve for making paper."

"But what will be the use of the pieces of paper that the woman picked up?" said George. "Can they be used again in paper-making?"

"Yes, they are occasionally mixed with the rag pulp, but only for the commoner kinds of paper. Even old railway tickets are worked up and serve again for the main part of new railway tickets, new thin paper being added on the outside. Paper that is made from rag alone is much stronger. But there is another use for old paper."

"What is that, Papa?"

"Many of the toys your sister plays with are made of old paper beaten into a pulp. Toys thus made are

much lighter than those made of wood. They are made in a mould."

"What! is that poor old cow of Lucy's that has been broken in half made of paper?" said George; "it is quite hollow."

"Yes; and the reason that paper toys easily split in half is, that they are generally made in two separate moulds, and the two parts are afterwards joined together. Such toys are well adapted for very young children, as the children cannot be hurt by the paper stuff as they might be by hard wood."

"I think I know something else, Papa, that is made of paper," said George. "I heard mamma tell Ann to bring up a paper tray the other evening; so I suppose trays must sometimes be made of paper?"

"Yes, all the better kinds of trays are made from paper prepared in the same manner as for toys," replied Mr. Harmer. "Some manufacturers make small tables of the same substance. They are beautifully painted and highly varnished, and are much admired. The chief manufactories of *papier mâché*, as it is called, are near Paris, though there are several in this country; but the best kind of paper trays come from Japan, where a particular gum-tree grows that yields a juice something like that of the Indian rubber tree. This juice, when it comes fresh from the tree, forms a hard varnish on anything that is covered with it. It cannot be dissolved, and resists hot water very well."

George and his father now walked briskly on for some time. Presently George begged his father to stop only for one moment to observe a man diligently searching in the road.

"Papa," said he, "I think that man must have lost something; he is looking about so carefully. Shall we ask him? He has picked up something, and put it into the pocket of his leather apron; what can it be? There, now he has found something else. Can you tell what he is doing, Papa?"

"I think I can guess," replied Mr. Harmer. "He is collecting all the horseshoe-nails that he can find. You may suppose, in a street where so many horses pass and repass, that many nails may be found."

"But, Papa," said George, "after they have been knocked about the streets, and the wheels of the carriages have passed over them, they must be so much bent that they can be of no use as nails again, can they?"

"No, George," replied his father; "nor are they required for that purpose. Shoe-nails, from their particular form, are required to be made of very superior iron, or they would snap in two. They are square, and thick at the top, and then become very tapering. The blacksmith makes them from a piece of iron of the same thickness throughout, and he hammers it till he has beaten it into the form he wishes, so that every part of the iron is well pressed.

It is from this circumstance, and from the quality of the iron which is always employed in making shoe-nails, that they are so valuable even after they have served their first purpose. That man is probably collecting the nails for the gunsmiths to make into gun-barrels.

"Oh, Papa," said George, "do tell me how they can make gun-barrels of the old nails, which I thought were quite useless."

"The nails are placed side by side with the heads at the top, about as many as my two hands could grasp, and bound with a small iron hoop just to keep them together. They are next heated till they are slightly melted, and are then violently hammered till they form one mass of iron. This lump is then again heated, and beaten with a heavy hammer into one long slip of iron; this slip, like a long bit of ribbon, is wound round to form a tube, the edges being made to meet, but not to lap over."

"Just, Papa, as I could make a tube by winding a slip of paper round a pencil. If I could gum the edges of the paper together, and then draw out the pencil, I should, I suppose, have a model of a gun-barrel. But, Papa," continued George, "how do they manage to make the edges of the iron stick together?"

"By heating the gun-barrel till the edges of the iron are slightly melted, and then giving the coil of iron several smart knocks at the top, which presses

the edges together. This is repeated several times till each part is welded. The coil of iron is then bored to the size required for the inside of the gun-barrel, and the outside is turned in a lathe till the iron is of the proper thickness."

"Papa," exclaimed George, "what a deal of hammering a piece of iron must go through before it becomes a gun-bar rel."

"Indeed it does, George, and for that very reason gun-barrels made in this manner are much superior in strength and durability to the barrels of the common muskets; but, from requiring more labour to make them, they are more expensive. I should, however, tell you that steel is now being made so much cheaper and better than it used to be, that a great many gun-barrels are now made out of it instead of iron. Old horse-shoes, George, when quite worn-out here, are sent to China, by hundreds of tons, and are worked up by the natives into shoes for mules. The mules being of a lighter weight than our horses do not require such strong shoes."

"What a noise that dustman makes, Papa," said George, "I can hardly hear you speak. There, he has gone into that house. I am glad we have got rid of him. I wonder what he does with his cart-load of rubbish!"

"I dare say that cart-load is worth several shillings," observed Mr. Harmer.

"Oh, is that possible! Why, I thought the dustman only cleared away the small cinders and ashes, which are of no use to anyone."

"They are of no use for parlour or kitchen fires," said Mr. Harmer, "and therefore some people are glad to get rid of them; but they are very useful for other purposes, nevertheless. There are immense heaps of cinders and ashes in waste places about London. When they are all properly sorted, the larger cinders are bought by washer-women for heating their boilers; and they pay as much as sixpence a bushel for them; that is, about a third of the price of fresh coals. They are also purchased by brick-makers for heating the brick-kilns. The smaller cinders and ashes are mixed with clay for brick-making. They are also extensively used for manure in stiff clayey soils.

"But look, George," said Mr. Harmer, "there is a man picking up pieces of broken green glass bottles. No one would think at first that they could be serviceable."

"Oh, yes, Papa, I could find out a use for them," replied George, quickly. "I have seen broken pieces of glass at the tops of garden walls. I dare say the man is collecting them to be used for that purpose."

"He may be doing so," said Mr. Harmer; "but it is more probable that he is picking up the broken glass to be pounded for glass-paper."

"Paper cannot surely be made of glass," exclaimed George, with surprise.

"No," said Mr. Harmer, laughing, "but a paper that is used by the carpenters and cabinet-makers for polishing wood is called glass-paper, from its being covered with finely powdered glass, which is fastened to the paper."

"Oh! now I understand," said George. "The powdered glass makes the paper rough."

After passing through many narrow streets, George and his father came to an open space, where there was a large heap of rubbish.

"Papa," said George, "I dare say some more useful things will be collected from that heap. But for what purpose can that man fill his wheelbarrow with old tin kettles and saucepans? Do you think he will find anyone to buy such old worn-out things, Papa?"

"Yes, very readily," replied Mr. Harmer. "All tin utensils, as they are called, George, are made of plates of *iron*, which have been dipped in melted tin, and thus become covered over with a very thin coating of tin, and those old saucepans and kettles are valuable because they are made of iron.

"But here we are," said Mr. Harmer, "at Mr Franklin's door, and I think we shall both enjoy our breakfast after our long walk."

The Pet Emu, and its Australian Neighbours.

"Aunt Mary," said Arthur Burton, "see how nicely we have mended the emu's egg that cousin Fanny sent me! It was broken into a great many pieces, you know, when it arrived. William Thornton helped me, or I never could have done it so well. He showed me how to cement the edges together."

As he spoke Arthur held up carefully a large egg of an olive green colour, and which had a curiously roughened surface.

"Yes, you have done it very well," replied his aunt. "I cannot see where the joins are. No wonder that in coming all the way from Australia the egg broke. But now you have mended it, it will be a capital addition to your cabinet of curiosities. I have just been reading cousin Fanny's letter. She says she thinks you will like to know something about emus, now that you

have the egg of one, and so she gives an account of an emu which she kept as a pet and of which she became very fond.

"Oh, Aunt, do read us all she says about it!" exclaimed the children.

"That I will; but first of all tell me if any of you know what an emu is like."

"I know, Aunt," cried Jane. "It is very much like an ostrich, but not quite so large. You know, we have seen emus at the Zoological Gardens. I should think they were about five or six feet high."

"Quite right. Can you tell me anything more about them?"

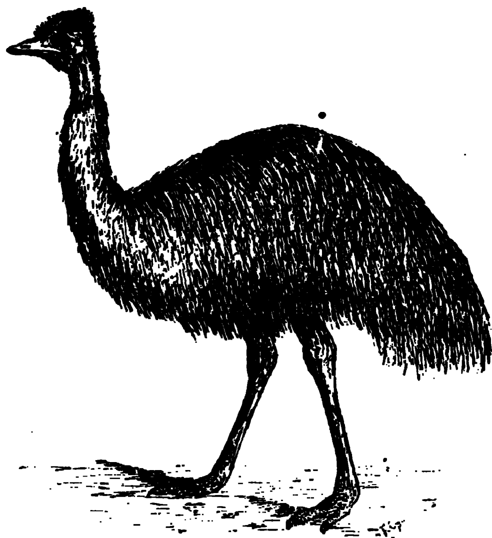
"Yes; their feathers are of a brownish-grey colour, and are fine and thick, something like hair. They cannot fly, but they can run very fast, like the ostrich. I don't know how many eggs they lay at a time. Can you tell me, Aunt?"

"It is said that they lay about six or seven, and it is the male bird that sits and hatches the eggs, whilst the female watches and guards the nest.

"Now I will read you cousin Fanny's account of her emu. She says:—

"I have had many pets in my life, but one of the most intelligent was an emu. He was quite young when James first brought him to our house, in a sack slung over his shoulder. The emu was very wild at first, so we put him into the large fowl-yard until he

should grow accustomed to us. He soon grew tamer, however, and was allowed to run about the fields with the horses and cows. One day, unfortunately, he strayed too far from home and a strange dog chased him. He could run much faster than a dog, but a



wire fence stopped the race, and the poor emu was bitten cruelly in the leg. James found him, brought him home, and bathed his wound. He was again put into the yard in order that he should have protection from further assaults whilst he was in a lamed condi-

tion. Every morning, when I went to attend to the fowls, I used to feed him on scraps of bread, or crushed Indian corn soaked in water. He would sit, or rather kneel, with his long legs on either side of the pan, meekly awaiting his turn amidst a crowd of greedy chickens, who perched on his legs whilst they ate up his food. I noticed that he was very careful not to hurt the chickens. As he walked about the farm-yard he would put his great feet very cautiously down that he might not tread on them. I was sorry for the wounded bird, and I used to stroke his head and neck and talk to him. He soon grew so fond of me that he refused to eat till I had left off stroking him. As long as I stood beside him he would nestle up to me, laying his head down on my shoulder, with a look of perfect contentment.

"After a while he recovered from his wound and was once more put into the field. He was always on the watch, however, for my approach, and if I appeared in the distance, he would come racing up to me. One day my sister happened to put on a large cloak that I usually wore. The emu saw her, and supposing her to be me, came bounding towards her from the farther end of the field, but as soon as he saw her face, he darted off again. I called him Moses. After a while he grew to his full height, which was six feet, but he was still never tired of being stroked, or of laying his head on my shoulder. I often gave him

little apples or hard peaches, and he would pick them up with his great beak as if they had been grains of corn. Each, as he swallowed it, made a large lump in his throat. He would stretch out his head in front of him whilst I gently stroked the lumps down; this helped him to swallow the fruit, and he fully appreciated the attention. But he would eat much less agreeable things than apples and peaches. On one occasion our carpenter, who had been repairing the door of a barn, happened to leave his bag of tools on the ground, whilst he went away for a few minutes. On his return he found Moses standing over the bag and very contentedly helping himself to the nails! He evidently much enjoyed his repast. I have myself also often observed him eating stones. He would collect them together into a little heap and then take up one after another till all had disappeared. I have been told that all birds that live on grain swallow stones to help them to digest their food. They act as grind-stones for them.

"We had a large dog named Watch, who used to chase the emu in play. Moses enjoyed the fun greatly. He would run slowly so as to keep pace with the dog, whilst Watch pursued him barking furiously. Then he would take his turn and chase the dog, kicking him before him, like a football, till Watch had had enough of it. Another amusement of the emu's was to chase the horses. He used to drive them round and round

a large field, till they were tired or till someone interposed and sent him away. But what he enjoyed most of all was to frighten the cows. At milking time, when our men drove them into the farmyard, Moses would station himself by the entrance-gate for the fun of making them scamper away. It amused me very much to watch his pranks. One day, I witnessed the following scene:—The men were driving the cows up to the entrance, where, as usual, Moses was on the look-out for them. As soon as they appeared he stood up on the points of his toes and made all his feathers stand on end! The cows gave one look at him, then turned and fled. Off went the men after them and, at last, having got them together with some difficulty, again drove them up to the entrance; but this time the mischievous bird made a sudden rush at them, and away went the cows again as fast as they could go. Again the men collected them, and once more tried to get them into the yard. Again, however, the emu was a match for them; he now stood on one leg whilst he waved the other round and round his head like an Irishman's shillelagh! This was too much for the poor cows, and away they scampered helter-skelter to the other end of the field! I now thought it was time to interpose, so I went up to Moses, and putting my arm round his neck led him off, out of sight of the terrified cows.

"I have told you how fond Moses was of me. Well,

on one occasion his affection nearly caused his death. I happened to go to the sea-side to pay a visit to some cousins. I had not been away from home till then since the emu first came to us. The morning after my departure he ran away. I am sure he went to look for me. At last he was discovered more than a mile from home and brought back. My mother tried to pet and comfort him in every way, offering him the food he liked best, but he turned away his head and refused to eat anything. He looked very miserable, and they soon saw that he would die unless I came back to him. Knowing how sorry I should be to lose my poor emu, James determined to follow me and to fetch me back. As soon as he arrived, he told me how matters stood, and I lost no time in starting with him for home. I found poor Moses lying with his eyes shut and panting from exhaustion. He was nearly starved, for he had not touched a morsel of food since I left. But directly I called him by his name he opened his eyes, and raising his long neck, he put his head on my shoulder. I soon coaxed him to eat, and in a few days' time he was as well and as mischievous as ever."

"I'm very glad he did not die," cried Arthur. "How fond he must have been of cousin Fanny!"

"Yes," said Aunt Mary. "I did not know before that emus could become so much attached to people."

"I wish I could go to Australia," exclaimed little

Willy, "and see all the wonderful birds and animals there?"

"Well, Willy, perhaps some day you may go there, but as you cannot go *now*, shall we look at some pictures of Australian birds and animals, and shall I tell you what I know about them?"

"Oh, do, dear Aunt!" cried the children. Arthur at once fetched from the bookcase some large volumes,



which he placed on the table before his aunt, and the children came and stood close by her, looking at the pictures as she turned over the leaves.

"There's the kangaroo!" cried Jane. "What a queer-looking creature it is, with its tiny front paws, its great strong hind legs, and its pouch with the little kangaroos inside."

"Yes! and it is this pouch that gives the name to the great tribe of Australian animals, to which the kangaroo belongs. They are called Marsupials, from the Latin word *marsupium*, which means 'pouch'. The females are all provided with pouches, in which they carry their young. It is a curious fact that the fossil bones, which have been found in the rocks of Australia, prove that the ancient animals that lived ages and ages before human beings were created, had also pouches."

"How could people find that out?" asked Arthur.

"In this way," replied his aunt. "A great many of these fossil bones have been carefully examined by learned men, who have been able, from their knowledge of the structure of animals, to tell us what those creatures were like when they were alive. Just as you, Arthur, could tell from the growth of a bare tree in the winter time, whether it was an oak or an elm, and could describe to me what it would look like when it was covered with leaves."

"I can understand that, Aunt," said Arthur, "and I know what fossils are like, for I have some in my cabinet."

"How does the kangaroo run?" asked Jane. "Isn't it difficult for it to move quickly with such short front legs?"

"No. It can go very fast. But it does not run like an ordinary four-footed animal. It only uses its

front legs when it is walking slowly. When the kangaroo wishes to go fast, it takes great leaps, using only its strong hind legs and its long muscular tail. The tail is as useful to it as a third hind leg. The large kangaroo can clear more than thirty feet at a single bound, and can leap over an object eight feet high. When attacked by dogs, the kangaroo will defend itself with its tail, striking its enemies heavy blows with it. But it will never attack other animals, or human beings, unless it is first attacked by them. The female is a very careful mother. She cleans out her pouch when the little ones are playing about her, then opens it and places them back again with her front paws."

"How comfortable the little ones must be in their funny bag!" exclaimed Willy.

"Yes. They look very comfortable. I was observing one the other day at the Zoological Gardens. When I came up to the place where the kangaroos are kept, the great kangaroo was lying on the ground, basking in the sunshine and chewing some green food. Beyond him, in a shed, was the female, and I could see a tiny head peeping out of her pouch. Presently, she hopped out of the shed, and the young one immediately jumped out of her pouch. The little thing was about a foot and a half high, and of a light yellowish-brown colour. It seemed wild with delight in being set free, and it almost flew round and round the

yard. The tiny hind feet seemed hardly to touch the ground as it bounded past me, like an india-rubber ball. The father and mother looked on approvingly, and the father sometimes gave it a gentle pat as it flew by him. After a little while it bounded back to its mother, pulled open her pouch with its front paws, and scrambled into it. When the little creature had settled itself, its two hind feet stuck out of the pouch, with its little head between them. Then the mother hopped soberly back to her house."

"I should like to have seen the funny little kangaroo, Aunt," said Willy

"I wish you had been with me, Willy. But do you know that the Zoological Gardens is not the only place in England where there are kangaroos? There are some running about wild in the Surrey woods on Leith Hill!"

"Why, how could they get there?" cried the children.

"It was in this way," replied Aunt Mary. "Mr. Evelyn, of Wooton Park, near Leith Hill, had a pair of kangaroos which were kept very carefully in confinement. One day, about fourteen years ago, the female escaped. The male tried to follow her, but he was killed, it is supposed, in the attempt. The female soon had young ones. They grew up, and, after a while, they, in their turn, had young ones. There are now about seven or eight kangaroos. They are of the

large kind, and are of a reddish-brown colour. They seem to live very happily in the woods. They are frequently seen on the slopes of Leith Hill, and sometimes even are observed close to the tower on the top of the hill. They come out from the woods in the evening in order to get food. They are fond of brambles. Sometimes the kangaroos get into a barley-field, and, when sitting up amongst the long corn, they have been mistaken by the farmers for men!"

"How I should like to see them," said Jane. "Aunt," she added, "do all the animals that live in Australia have pouches?"

"Almost all," replied her aunt. "There are Australian bears, squirrels, weasels, and rats, and many other creatures; but all of them have pouches and look very different from the animals that we know by these names."

"What is that queer creature?" cried Arthur, pointing to a picture in the book. "Look, Aunt Mary; it has a body like an otter and a bill like a duck!"

"That is the ornithorhynchus. Is not that a long name? It means 'bird's beak,' but the common name for the animal is duck-bill. The duck-bill, the porcupine ant-eater, and the dingo (a kind of dog), are the only animals of Australia that are not provided with pouches.

"The duck-bill is indeed a most strange-looking crea-

ture. It seems to be something between an animal and a water-fowl. It has a bill like a duck, and its fore-feet are webbed; but it has the body and thick furry coat of an animal. Its tail is large and flat like the blade of an oar, and greatly helps the animal when it is swimming.

"In this picture the duck-bill is represented lying



on its back whilst it combs its fur carefully with the claws of one of its hind feet.

"I was reading an account of the duck-bill," continued Aunt Mary, "this morning in an encyclopædia, so I can tell you something of the creature's habits. The duck-bills live on the banks of rivers and lakes, and dig burrows for themselves, where they lie sleep-

ing during the day, but come out at night. These burrows are long, narrow tunnels, which extend underground for about twenty feet; the duck-bill makes its nest at the extreme end. The nest is formed of roots, and grasses loosely interlaced together. The mother duck-bill sometimes feeds her young in a very strange way. She makes them follow her into the water, and then sends out her milk so that it floats on the surface of the water, and the little creatures immediately suck it up. The young ones have occasionally been caught and kept as pets for a time. A gentleman who once had some says 'they were very frolicsome, and played like kittens. They liked to dabble about in a large dish filled with water. Their food consisted of bread sopped in water, of hard-boiled eggs, and meat chopped up very fine.' The duck-bills can swim as fast as fishes, and can also run swiftly on dry land. When they go to sleep they roll themselves up like hedgehogs."

"Don't you think, Aunt, that the people must have been very much surprised that first discovered the duck-bill," asked Jane. "It is so very different from any other animal!"

"Yes," answered her aunt, "and when the first specimen, which had been stuffed, was sent over to England towards the end of last century, it created a great sensation. Some of our scientific men refused to believe in it. They thought that the Australian

colonists had played a trick upon them, and that they had themselves fastened the bill of a duck on to an animal's head!"

"I don't wonder they thought so," said Jane.

"How big is it?" asked Arthur.

"It is about nineteen inches long. There is a stuffed specimen at the Natural History Museum at South Kensington. I must take you to see it some day."

"I should like that very much," said Arthur. "Oh, Aunt Mary," he continued, as he observed her take out her watch and look at the time, "there is one thing that I want particularly to ask you about before you go, and that is about the trees in Australia. Cousin Fanny speaks of 'gum-trees' in her letter. What are they like? Are they at all like our trees?"

"Yes. I have been told that at a distance the gum-trees are not unlike our elms in appearance. But they grow to a much greater size than any of our trees. The tallest are in Victoria. They are more than four hundred feet high! That is higher than St. Paul's Cathedral!

"I was talking to your cousin Charles the other day about the great forests there. He knows them well. He says they are grand beyond description. They are like three forests in one. First, there are the great tree-ferns with their graceful fronds arching overhead. Next, above them, come the mimosas with their flowers, like soft yellow balls, hanging high up

in the air (for these mimosas are as tall as our largest forest trees); then, again, far, far above them, and hidden from sight by the undergrowth, rise the gigantic gum-trees. Their branches form a complete roof to the forest, which shades it from the heat of the sun and protects it from the high winds. Cousin Charles says that he happened to be travelling, some time ago, through one of these forests during a great storm. He could hear the wind howling and raging overhead; but so still was it within the forest that not a leaf stirred. He took a match-box out of his pocket, struck a match, and held it up to see if the flame would flicker, but the flame burnt quite steadily till the match was consumed."

"How safe cousin Charles must have felt, Aunt!" cried Jane; "the air must have been as still in that wood as it is in this room, or else the flame could never have burnt so steadily."

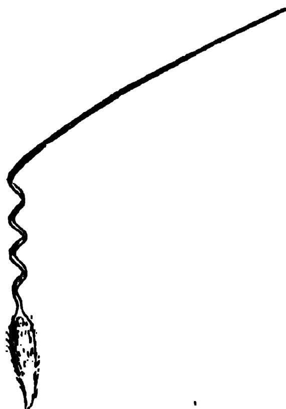
"Are there pretty birds in the forest?" asked Willy.

"Yes," replied his aunt; "there are parrots of all shades of colour—red, blue, and gold—and lovely little green paroquets; and there are robin-red-breasts and wrens. But the Australian robin has a breast of vivid scarlet, and the wren has a sky-blue breast and a blue tail. There are magpies and martins that sing beautifully! Then there are squirrels, so formed that they can fly from bough to bough as if they were birds,

and opossums that somewhat resemble both squirrels and monkeys, and that swing themselves from the branches by their long tails."

"Aunt! it must be like fairly-land!" cried Willy.

"I think so too, Willy," answered Aunt Mary. "There was another thing I must tell you about," she added, "that cousin Charles mentioned, and that was the curious kinds of grasses that grow upon the great plains—one especially he spoke of that has (what is called) a winged seed. Here is a little picture of the seed," she continued, turning to a small print in the book before her.



"This long, bent tail, or wing, to the seed is spiral —that is, it is twisted like a cork-screw. When rain falls, or there happens to be a heavy dew, the twist

partly uncurls itself; but when the sun comes out and the air becomes dry the twist curls up again. Now, the act of curling up causes the seed to move. Cousin Charles says that at such times it appears as if the whole ground for miles round were moving along! It has a most strange effect! When the little seed is stopped by some small obstacle, the bent end of the wing turns round and round like the handle of a screw-driver and forces the seed into the earth."

"I should like very much to have some of those seeds in my cabinet," said Arthur. "May I write and ask cousin Fanny to send me some?"

"Yes. I am sure she would not mind your doing so. I must go now and write my letter to her, for the Australian mail leaves this evening. You had better write your letter also."

George put away the books carefully, and then went to his desk to begin his letter, while Jane and Willy went upstairs to fetch some drawings which they had been making for their little cousins in Adelaide.

Minnie's Account of Her Travels.

Almost all little boys and girls who live near the suburb of Highgate must know some pretty white houses facing the fields, between Highgate and Hampstead—those beautiful fields, with their large ponds for sailing boats; with the merry haymaking in summer, the dog-roses, the red campion and crow's-foot, and a hundred other delights for everybody.

At the time of my story there were very few flowers left in the fields; even the blackberries were all gone; for October was already half over, and little boys and girls now liked to draw round the fire in the chill evenings and read about travellers and their adventures.

If you and I had been able to peep into the drawing-room of one of the white houses before-mentioned, on a cold, wet evening, we should have seen two little

girls, of about ten years of age, running every now and then to stir the blazing fire, and then squeezing their faces against the window-panes, and straining their eyes in the direction of the garden gate. A pleasant-looking young lady was busy also in running to the window, arranging the tea-table, and giving directions to the housemaid. A great black dog was lying before the fire; the only one present who seemed to see no reason for disturbing himself, and who winked lazily, with his head on his outstretched paws.

One of the little girls ran up to him, and, putting her arms round his neck, said:—

"Darling old Rover, shan't you be glad to see your master and mistress and Minnie again?"

At this Rover pricked up his ears, rose up, shook himself, and gave a short bark.

"Dear old doggie!" cried the little girl. "Just look, Miss Morison; Rover knows quite well when I speak of papa and mamma!"

Here the other little girl came from the window and said, rather despondingly, "Miss Morison, I don't believe they 'll come to-night."

"Patience! patience! Helen and Edith," answered the young lady, who was the children's governess, and whom they dearly loved. "Remember how far your father and mother have to travel. A hundred little things may happen between here and Birmingham to make them late."

The children watched a little longer, and then a loud "Here they are! here they are!" burst forth; and in an instant Helen and Edith rushed downstairs, followed by Rover, and would have run out to the garden gate, in spite of the pouring rain, if Miss Morison had not caught hold of them. Rover, however, was to be stopped by no one; he was at the gate in an instant, leaping up, barking, wagging his tail, and giving his hearty welcome to the travellers.

Helen and Edith were delighted to hear Minnie's voice, exclaiming—"Look, Mamma! there's Rover! Rover! Rover! dear old Rover!" Then the coach-door opened, and out stepped Mrs. Hale, Mr. Hale, and Minnie; and in a minute the three little sisters were hugging each other, their parents, Miss Morison, and Rover. Then Helen and Edith led Mrs. Hale and Minnie upstairs to the warm, cheerful drawing-room, and seated them on the sofa, exclaiming all the while—"Oh! we thought you'd never come! We watched for you a long time! Do tell us all about Wales! We are so glad you've come home at last! You have been away two whole months! It was such a long time! But we have been very happy with dear Miss Morison; and, do you know, I have got a new canary? And, oh! have you seen the white kitten? And did you hear about Aunt Mary asking us to tea?"

As neither Mrs. Hale nor Minnie could possibly answer all these questions at once, they merely hugged

Helen and Edith again, and allowed them to take off their cloaks.

"When will papa have finished paying the coachman?" cried Edith; and she ran down to bring Mr. Hale upstairs. Helen went to the nursery with Minnie, to help to take off her wraps, but would not let her tell anything of her travels, as she said she and Edith had promised each other not to hear a word till Minnie could tell them both together after tea.

When the little girls returned to the drawing-room they found their father and mother and Edith seated at the tea-table, upon which the urn was hissing merrily, and Miss Morison making tea. Helen and Edith could hardly eat their bread and butter for starting up every minute to carry round the cups, and to hand everything to their father and mother at once.

At length tea was over; and when the tray had been removed, and while Mr. and Mrs. Hale were engaged in conversation with Miss Morison, Helen and Edith sat down upon the sofa, with Minnie between them, and said—"Now, Minnie, do tell us all about everything. Begin when you left us at Euston Station."

"Oh! when I left you I was very happy in thinking of all I was going to see with dear papa and mamma; but then I could not bear leaving you, and you were so kind in liking me to go, though having no pleasure yourselves. So I am afraid I looked a little unhappy; and mamma asked me what I was thinking about; and

when I told her, she said that you and Edith had been very kind and unselfish in sympathizing with me so much, and in cheerfully staying at home yourselves, because papa and she could not take more than one; and mamma said that next time one of you should travel with them."

"How very kind of dear mamma," cried Helen and Edith; and Minnie continued—

"So then I was quite happy, and began to think of all the things I should see and do, and what sort of a place Chester would be; for we were going there first.

"We changed carriages at Crewe, and at last we came to Chester. It is such a curious place—I never saw anything like it before. There are beautiful old houses, something like Crosby Hall in Bishopsgate Street. Don't you remember the day we went to see St. Paul's, papa making us look out of the coach-window at that curious old house?"

"I remember it quite well," cried Edith. "And you told us in your first letter that you slept at Chester. Where did you sleep?"

"We stayed for one night in a nice funny old inn, called 'The Blossoms.' There were so many long passages, I thought I should lose my way whenever I went from my little room to our parlour. I got up early the next morning, and father and I walked all along the top of the great wall, which is built round the town, and which is quite wide enough for two

persons to walk on, holding hands. There is a railing on the top. Papa says the wall was built a long time ago to keep out enemies; and there are towers in the wall, so that men could shoot down upon those who wanted to take the town. I am very glad Chester has no enemies to fight now. There is such a lovely view from the wall, of the river Dee and the fields and hills round, with the Welsh mountains a long way off!

"We left Chester that morning, and went in the train to Llandudno. We stayed there, as you know, a long while. We were very happy there! It is such a beautiful place!

"The day after we arrived was very wet and windy, and I was longing all the morning to go down to the beach. At about twelve o'clock the rain left off; and papa went out for a little walk. Presently he came back, and told me to put on my boots and come quickly, for a vessel had been wrecked on the rocks that very morning! Mamma was too tired to go, but I got ready as quickly as I could, and ran with papa to the slopes of the Great Orme's Head, which is a high rocky mountain with the sea nearly all round it. And there we saw the poor little ship lying on one side against the rocks that she had been dashed upon. The sailors had escaped in a boat belonging to the ship, but it was very difficult to manage it on such a rough sea; and before they got to land the boat was half full of water, and ready to sink.

"It made me very sad to look at the wreck; the sides had all been knocked in, and the waves were breaking over the deck; and masts and casks and pieces of wood were floating about in the water. I felt so sorry for the poor captain, for the ship belonged to him. The people at Llandudno got up a subscription to help him and his crew."

"Poor things! I am glad they were saved, and that the people were kind to them," said Helen.

"But I should have liked to see a real wreck!" said Edith.

"One evening," continued Minnie, "papa took us in a boat—quite a large one, with two sails—to a beautiful cavern in the Little Orme's Head, which is another rocky mountain on the other side of Llandudno."

"Oh, stop, Minnie! I don't understand," exclaimed Helen. "You told us in one of your letters that Conway Bay was on one side of Llandudno. Now, Llandudno is not on an island, so it can't have so many sides."

"I shall go and fetch the atlas," cried Edith; "or else I am sure I shall not know where all the places are you are going to tell us about."

Edith brought the atlas; and, when they had opened it at the map of England and Wales, Minnie showed her sisters that Llandudno was situated on a narrow peninsula, with Conway Bay on one side, and Llan-

dudno Bay on the other; Llandudno Bay being formed by the two projecting mountains called the Great Orme's Head and the Little Orme's Head. She then continued:

"Well, we went in the boat to this cave in the Little Orme's Head. How I wish you could have been with us! When we arrived at the entrance to the cave, I thought our boat could not possibly get in; there seemed such a very small opening. But the boatmen took down the masts, and we stooped down and managed somehow to get in, all under great rocks. When we were able to lift up our heads, it was almost dark, so that at first I could see nothing, and could hear only the waves thundering on the little stretch of beach. They made such a noise! But soon I got accustomed to the faint light; and then I saw how beautiful the colour of the water was—quite a brilliant green. I could see just a tiny hole up high on one side, and from it a faint silver light gleamed down from the sky and showed the enormous height of the cave. It made me think of Rolf's cave in *Feats on the Fiord*. I am sure his cave must have been just like this one; only Rolf was quite safe at high water on the top of the sloping beach; but if anyone were in this cave at anything near high water, they must be drowned, for the beach is low, and the rocks are so steep that no one could possibly climb them."

"If it was like Rolf's cave, I can imagine it very

well, because I have just been reading *Feats on the Fiord* again," said Edith. "How very beautiful it must be!"

"But, Minnie," said Helen, "you have not told us whether you saw any Welsh women, wearing men's hats, at Llandudno."

"And you have not told us about the Welsh ponies. Did you not say you all rode to Conway Bay on Welsh ponies?"

"Yes, I did," said Minnie. "But, first, Helen, we did not see any Welsh women with tall hats like papa's at Llandudno; we saw some afterwards at Bangor; but there were a good many women with round felt hats, like papa's garden hat.

"It is so strange to hear almost all the people talk Welsh. Of course I could not understand them; but I can say a few words. 'Dim Cymreig' means 'I can't speak Welsh.' I said it to an old woman who began to talk Welsh to me. She was spinning wool with a spinning-wheel, in a little house by a waterfall near Trefriw.

"The Welsh ponies are not at all pretty, like English ones, but they trot along very nicely, and papa says they are more sure-footed for climbing than ours. We rode to Conway across the sands. Such a beautiful ride! But the ponies sank almost up to their knees in the sand at every step, which made us get on very slowly. Conway is a very pretty little

town, with an old wall, like Chester, all round it; and such a fine old castle! Mamma made a sketch of it, and I tried to make a little one; but then I liked to run about, and see all the curious nooks and corners. It would be a capital place to play at hide-and-seek in. If you had been there we would have had a game.

"There is a very deep copper-mine in the Great Orme's Head, nine hundred feet deep! Papa says that is more than twice the height of St. Paul's! I looked down the shaft—like a deep well—that the men go up and down in a large bucket. They have to sit on the edge with their feet inside. It looked so black and dismal down the shaft! I am sure I should never be brave enough to go down. I am very glad I am not a miner! A little boy and girl sold mamma some pretty pieces of copper ore from the mine. Mother says we may put them into our curiosity boxes.

"When we left Llandudno we drove in a Welsh car—such a nice sort of carriage!—to the loveliest place, I think, I ever saw—Llanrwst. We went to a large hotel, close by a pretty old bridge over the Conway river. But I told you about that in my letter from Llanrwst; so I will go on to something else now, as I am afraid mamma will want us to go to bed soon."

"Oh, then, be quick, Minnie; never mind Llanrwst: tell us about your going up Snowdon. Miss Morison says it is the highest mountain in Wales," said Edith.

"Well," continued Minnie, "I'll tell you about Snowdon, then; but I must not forget to tell you, to-morrow, about the hotel at Capel Curig. Only fancy! they have a pretty little water-wheel, by a rushing stream, to churn the butter! I must tell you also, to-morrow, about the splendid waterfalls between Llanrwst and Llanberis. Llanberis is the name of the nearest village to Snowdon."

"Almost every name in Wales begins with Llan," cried Helen.

"Yes; father says Llan means a place of meeting, or a village."

"Oh, never mind about Llans," said Edith; "I do so want to hear about Snowdon. Did you not go up on ponies?"

"Yes. I could not walk so far, neither could mamma; but papa walked all the way. We took some shawls to put on when we got to the top, because papa said it would be cold up there, and we strapped them to the pommels of our saddles. I had a very nice pony; it always liked to go on in front of mother's, and the guide called it Topsy. The guide was a good-natured old man; he had been a guide for more than twenty years, and told us many stories about travellers going up Snowdon. He showed us a fearful precipice, where a poor clergyman fell down some years ago. He knew all about the mountain plants also. His little boy went with us, but he

could hardly speak any English. My pony always found the best way herself; so I did not try to guide her. When we had gone some way we rested and looked about us; and, oh! Helen and Edith, we saw such a beautiful view! though not nearly so fine as the view from the top.

"It took us three hours to get to the summit. Sometimes the road was so steep and rocky that I was afraid, and wanted to get off Topsy; but the guide said I was quite safe, and papa laughed at me, and told me he had ridden on mules on the Swiss mountains along the edges of steep precipices; so I tried to trust to Topsy and not be afraid.

"When we got near the top, we had to go up a very rough pathway by a horrible precipice; and Topsy would go close to the edge because the road was best there! At last we got to the top, and how I wished you could have been there! We could see as far as the Isle of Man on one side, across Holyhead and Anglesea to Ireland on another, and also the mountain called Cader Idris on another. We counted twenty lakes (some of them called tarns) high up in the mountains. Two on one side of Snowdon are called the Blue Lake and the Dusky Lake.

"The guide said we were very fortunate in having such a clear day; and that there had been only two days like it all the summer.

"We went into a little house, built at the top, to

have some luncheon. The air was not as cold as I expected it to be; it only felt like early morning; but the butter and bread and cheese were all very cold. A boy asked us if we would take some tea or coffee; but we found they had no milk, so we certainly would not take any. I suppose it is difficult to get milk up there.

"We stayed at the summit about an hour, and then we came down again, which was much worse than going up. I thought Topsy would tumble at every step!"

"Oh! I should like to have been with you," cried Helen.

"Yes; it must have been delightful," said Edith, with a little sigh.

"Yes," cried Minnie; "and I am so glad to think you or Helen will go next time."

"Thank you, dear Minnie; but now, pray, go on; what did you——"

Edith stopped suddenly; for somebody was suspending something so near to her eyes as to touch her nose. She started back, and saw Mr. Hale's arm and hand over her head, holding his watch; and Edith, looking at it, saw that it was ten o'clock.

"I think certain little folks will never be up in time for breakfast if they talk much longer," said their father.

"Oh! papa, Minnie was just going to tell us about

the Llanberis slate-quarries and Bangor, and all your visits to Aunt Helen at Lichfield, and Uncle Lawrence at Birmingham; but I suppose we must hear about those to-morrow. Good-night, dear Papa."

"Good-night, dear children."

THE GREAT WATER-BEETLE.

THE little museum of Charles Long gave his brother quite as much pleasure as Charles had hoped it would. Alfred not only admired it exceedingly, and examined every object minutely, but he was as desirous as his brother to add to the collection.

Thus the two boys had always some pleasant object in their walk which equally interested them both.

Sometimes they climbed old decayed trees, to search amidst the crevices of the bark for several insects which frequent these spots, or to examine the deep holes where the fine rotten powder of the wood formed a place of concealment for various kinds of caterpillars, during their pupa state.

At other times the brothers raked and fished along the edges of small streams, searching for fresh-water mussels, hoping to find the English pearl; or for

spiders, and other insects which skim lightly along the surface of the water, not by swimming, but by actually walking. In searching for one thing, many other curious objects, well worth observing, were often found.

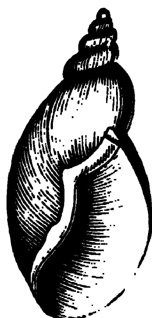
When the boys wished to extend their walk after they had collected as many objects as they cared for at the time, they used to form a kind of dock by damming up the mud of the stream or pond into a circular bank, and there deposit the different things till they returned. They took good care, however, to separate the larger insects from the others; for some they found were so voracious that the smaller easily fell a prey to them.

On one of these exploring expeditions Alfred and Charles went to a neighbouring pond to search for the long taper water-snail (the *Limnæa*), that creeps along the surface of the water, precisely as the common snail does on land, with the difference only of having the shell and body reversed. They soon found the object of their walk. The day was fine and warm, and the snails were not particularly active. They appeared to find quite enjoyment enough in reposing on the leaves of the water-lilies, or in suspending themselves over the surface of the clear pond. Whole clusters of them, of every size, were in these positions. Suddenly there appeared a commotion among some of them, and one after another quickly let itself

drop to the bottom of the pond, while those on the rushes, or water-lilies, attempted to crawl hastily away.

What could occasion these movements? It was some time before either Alfred or Charles could find out.

At length Charles exclaimed, "I see, I see! There is a leech, a great leech got in among them! Look, Alfred, there he is twisting and turning round that poor snail, and he has buried his head right in the body, as if he would devour every morsel. There, the shell of the snail is floating away quite empty. Do not you see the large black fellow near that tall water-plantain?"





"Yes, I see it now," replied Alfred; "but I do not think it is a leech. It is some kind of insect that we have never seen before. Let us catch it."

The net was ready in a moment, and to their great pleasure the black fellow, and two or three snails,

were soon brought safely to land, besides a variety of other insects.

A little dock was quickly formed, and filled with water, and the strange-looking insect, together with the snails, placed in it.

"What enormous jaws the creature has!" said Charles. "You may well say it is not a leech, Alfred. No leech has a fierce-looking mouth like that."

"Nor six legs, as this insect has," said Alfred.

"See, it is floating on its back like a water-boatman; there, now it has seized one of the small snails; and look, it has turned itself again, and has placed the snail on its own back."



"What *can* it do that for?" exclaimed Charles.

"I suppose he thinks he can smash the snail better in that position," said Alfred, "for he is crushing it between his jaws and his back. The snail is gone so far into the shell that he cannot easily get at it without breaking the shell. How he is sucking it!"

"But how curiously the head of this black fellow must be placed," said Charles, "to enable him to turn it round, and eat the snail from off his own back. If I turn my head ever so much, I can scarcely see a part of my own back; but he twists and turns his head and body in every direction, as if there were no

difficulty about the matter. Let us take him home, Alfred, and also some of these little flat snail-shells that have stuck to the net."

Alfred agreed; and, by means of a little tin box, and a large-sized bottle or two, the boys secured all the insects they wished to take home, leaving such as they well knew to enjoy themselves in the pond again.

When they arrived at home, Charles ran to their mother, and begged her to come to them in his own room. "Do come, Mamma, for we have something most curious to show you; something that I think you have never seen before. Alfred has gone into my room with it. Can you come now?"

"I will be with you almost directly," replied Mrs. Long. "I am glad you have found something that is new to you."

Content with his mother's answer, Charles hastened to his brother, to help him to place the different objects in fresh tumblers of water.

"Now, Mamma," exclaimed Charles, as Mrs. Long entered the room, "have you ever seen this pond monster before?"

"Yes," said Mrs. Long; "I have seen them in the ponds three or four times, and once I kept two in a bottle of water for several weeks. I am not surpised at your giving it that name, Charles; for it is a most voracious creature, and preys upon all the other water

insects, besides destroying the spawn of fish, and even the fish themselves when in a young state. In France they are called '*Vers assassins*' (assassin worms), on account of their greedy voracious nature."

"But what are they, Mamma?" inquired Alfred. "They are not really worms, are they?"

"No; they are the larvæ of the 'great water-beetle,' which is a very interesting creature, and one of the largest of our English insects. The perfect insect measures nearly two inches in length, and, when its wings are extended, four inches across."



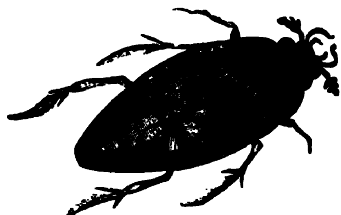
"Have you ever seen the beetle, Mamma?" said Charles.

"No, though I have often wished to do so; but I have read about it, and I can show you a print, if

you like, both of the larva and the perfect insect. Alfred, fetch 'Shaw's Insects' from the parlour for me."

The book was procured, and Mrs. Long, by turning to the index, quickly found the print she sought for. "*Hydrophilus piceus*" was the Latin name of the insect.

"The extremities of four of the legs are covered with hairs," said Alfred; "just as the legs of the water-boatman are covered, and which you told us, Mamma, assisted the water insects in swimming."



"Yes, they do so," replied Mrs. Long; "for the hairs are placed so closely together that they act like little fins. The great water-beetle swims and flies remarkably well, but it walks badly."

"What can this long pointed thing be," said Charles, "which is represented on the under side of the body?"

"It is a very long and sharp-pointed spine, which seems like a continuation of the hard shelly covering of the throat, and extends more than half the length of the body; but I do not know its use, or whether it can be raised at pleasure."

"And this little nest, Mamma?" said Alfred, point-

ing to a print in the book. "Is that formed by the great water-beetle for its eggs?"

"Yes; and a very curious nest it is. I wish you could find me a real one. I have long searched for one in vain, though they have frequently been observed, and even the whole method of constructing them, by other persons. The great water-beetle, and a few insects nearly resembling it, are the only insects known to spin an egg-pouch like the spiders. Of these, the great water-beetle alone attaches the pouch to a water-plant, and when complete leaves it. The other *hydrophili* carry them about with them like the wolf-spider, attached to the under side of the body."

"Tell us all you know about this nest, Mamma, if you please," said Alfred.

"I have read in Kirby's work on insects," replied Mrs. Long, "that the general appearance of the nest somewhat resembles a small turnip-radish when reversed. It consists of an inner pouch formed of a light white down, which immediately surrounds the eggs, and keeps them from injuring one another; while the exterior tissue is made of a kind of glutinous paste, which, when once dry, becomes a flexible covering, through which the water cannot penetrate. From the centre of the nest rises a little curved horn



about an inch long, which is of a silky nature, shining and porous, and which allows the air to enter."

"And how do the larvæ get out?" said Charles; "do they cat their way through?"

"No; they escape by an opening which is left for that purpose, and which in the print is shown by that dark spot. This part, before the eggs are hatched, is closed by a very thin tissue, which can be easily broken through, though the water cannot enter. Thus the little larvæ are protected from the voracity of fishes and insects, until they quit their curious cradle. The parent insect is furnished with a pair of spinners to form her nest with, something like those of the spider, and she works with great quickness and agility, never leaving it till she has completed her task."

"And how long is she about it?" inquired Alfred.

"M. Miger, a Frenchman, who has observed these insects very accurately, says the general time is about three hours. He has had three great water-beetles at a time all spinning before him."

"And was he ever able to rear the eggs?"

"No; he observed with pleasure the young larvæ quit the nest, enter it again, and sport for some time around it, but he could not succeed in finding out the proper food for them in their tender state. Those that he had taken from the ponds, however, and which were considerably older, he managed to keep until they became perfect insects."

"Indeed! and what did he feed them with, Mamma?" asked Charles.

"Small pieces of raw meat."

"And does M. Miger mention, Mamma, how long the insect is in growing from the time that the egg is laid till it becomes a perfect beetle?" said Alfred.

"Yes; he thinks it is about ninety-eight days; and of this time the insect passes sixty days in the larva form."

"And how am I to know when my larva is going to change into the pupa, Mamma?" said Charles.

"You must sink the tumbler of water in a large pot of earth," said Mrs. Long; "and when the larva is on the point of passing into the pupa state, it will come out of the water, and employ its large jaws and feet to dig a little circular hole in the earth. Into this it will creep; and, covering itself over with earth, will carefully close its cell, leaving no kind of opening. It will remain there about three weeks, gradually casting its skin aside, and acquiring little by little its new form. When every part is perfect in form and hardened, the insect will break open its prison."

"I wish, Alfred, we may be able to keep ours till it changes," said Charles, as his mother finished speaking. "I think we must cover the pot of earth with some gauze or net or we may chance to lose him when he is leaving the water."

"Yes, so we will," replied his brother; "but do not

take it away yet. It appears to me, Mamma, that this larva breathes through the tail; for if you observe it well, it frequently rises to the surface of the water, and the tail is always a little raised above the water, and even now that he is swimming head downwards his tail is just on the surface."

"I believe that is the habit of several aquatic insects, Alfred, as well as of this larva," replied Mrs. Long. "I have watched the motions of many that I have not been able to learn the names of, which seemed to be perpetually ascending and descending, tail upwards, to the surface of the water for the purpose of breathing."

"Is the beetle itself as voracious as the larva?" said Charles.

"No, it lives as much upon vegetable as on animal matter, and, therefore, is not such a dreadful enemy to the smaller insects as the larva. There are other beetles similar in outward form to the great water-beetle, except that they are smaller, but whose habits are quite different; therefore when you search the ponds for the *hydrophilus*, do not be sure you have found it until you have well examined it with this print by your side. I can show you books that contain fuller accounts of this larva, but I should like you to keep the larva for a day or two, and to tell me first what peculiarities you may observe yourselves."

"Yes, I should like to do that," said Alfred; "for

it is very pleasant, I think, to find out the very same things that learned people have written about. Has it not struck you, Mamma, how oddly this larva floats on his back? And the head is so curiously twisted, that it causes you to mistake the lower for the upper side. Upon first seeing it, indeed," continued Alfred, laughing, "I half thought his legs grew on his back."

"It had been so described by several authors," said Mrs. Long, "until more careful observers gave us correct information."

A Rainy Morning.

One morn, a young bee, just awakened from sleep,
Made haste at the hive's little entrance to peep:—
She longed to make trial of newly-found powers,
To bask in the sunbeams, and taste of the flowers.
But hard-pelting raindrops forbade her to roam,
She must stay in the hive, and be prisoner at home.
"Alas!" hummed the bee, "this sad rain will destroy
Those beautiful flowers I hoped to enjoy;
The blossoms will fall from the sweet-scented lime;
We shall gather no honey from jasmine or thyme:
I had thought the whole meadow and wood to explore,—
Now nothing remains but to feast on our store."
—"Ah no," quoth an old bee, "while showers confine,
We have part of our hive to fresh varnish and line;

The babes in the cradle are needing our care,—
We have six cells to build, and the queen's to repair.
So you see, my young friend, we have plenty to do,
Ere sunshine invites us our flight to renew.
We have no time to be idle; and blame not these showers,
For rain, I assure you, refreshes the flowers;
The clover will soon be an exquisite treat,
The jasmine more juicy, the bean-field more sweet!"

Gyp, Dandy, and Frisk.

I AM going to tell you about some dogs of my acquaintance, but before I begin I must inform you that our dogs are not very different from other dogs, and that my tales are true tales.

Gyp is a terrier. He has a smooth shiny black coat, with a little tan here and there. You know that in this world people have different trades or professions. Well, Gyp belongs to the medical profession. His master is a doctor, so, of course, Gyp must be one too. He behaves very properly when he visits his patients. There is no angry barking or noise of any kind to disturb the sick room. He does not say much, for he does not like to commit himself, but he looks very wise. A learned man says, "Speech is silvern, Silence is golden," so he and Gyp agree. Gyp is always civil when he receives his patients in the consulting room, however poor they may be, but a

stranger who has no definite business is quite another thing. When Gyp sees one at the street door, a deep growl at once shows that his suspicions are on the alert. Gyp does not understand much about money, so he takes his fees from his patients in sugar, of which he is very fond. The warmest feeling of Gyp's heart is love to his master. He only likes to be with me and a few other people when he cannot be with him. When the doctor is out, Gyp watches and listens eagerly for his return. He likes to stand on a chair by the window, with his front paws on the window-sill, watching. Directly he hears the loved footstep, he flies, like an arrow from the bow, to meet it.

Both Gyp and Dandy are full of life and fun, especially Dandy, for he is the younger, and though fat, is not so fat as Gyp.

Dandy is like a mop. When he has been washed and combed and has had a blue ribbon tied round his neck, he looks highly respectable, even aristocratic; but he likes to go into ponds, and then, whilst he is still wet, to roll himself over and over in the dirty, dusty road. So I fear his appearance is sometimes rather low. His chief accomplishment is to beg. I never saw a dog beg so well as Dandy; he sits so firmly on his little hind legs, with his spine erect and his front paws hanging in front of him, like little flappers. Sometimes, I get almost cross to see him

sitting motionless for such a long time "begging." I look away, but somehow I cannot help seeing him. There he is, still at it, his little bright black eyes peeping through his matted curls. He, too, is very fond of sugar. When I give him a piece, he takes it between his paws in a very polite manner.

Dandy has several intimate friends in the town. Mrs. W., the confectioner, Mrs. J., the greengrocer, Mrs. R., who has a general shop, and Mr. P., the butcher. At their shops he makes a capital business of his begging. He likes to be served just like the other customers, and so he places himself upon a chair on the right side of the counter. He never runs to the back, or eats off the ground. Mrs. W. gives him sponge cake, and this he requires to be broken up into small pieces before he will eat it. I fear Dandy is what is called a "cupboard lover," for I have just now seen him in the kitchen kissing the cook for a piece of biscuit.

How Dan does love going out for a ramble, especially when he has the run of a breezy common! We sometimes walk to Rowley Green. It is a pretty place, all ups and downs, pools and hillocks. Dandy seems mad when we get there. He runs round and round like a wild thing, his little feet go so fast they can hardly be seen; his ears and tail fly in the wind. If I try to catch him, away he goes, now in the pools, now rolling over and over on the turf. If he can get

some unfortunate geese or ducks to chase, his happiness is complete.

Dandy and Gyp live very comfortably together. Gyp has now and then an angry glare in his eyes, and might grow jealous, but Dandy never gives him any cause for vexation.

Now, I must tell you about Frisk. He was not my dog, he belonged to an uncle of mine, but I knew him very well, for I often visited this uncle in his home near Birmingham when I was a little girl. Frisk was a spaniel, and a very handsome one. He was black and tan in colour and had long silky ears and bright intelligent eyes. He was the most accomplished of the three dogs, because he had received the best education.

Sometimes, when we were just going to start for a walk, and my aunt was not quite ready, we used to tell Frisk to go and fetch her. Off Frisk ran to her room, and by tearing backwards and forwards on the landing, he would soon make her understand that we were waiting.

He was very clever at finding anything that we had hidden, provided that we first let him see it. I used to show him a half-crown, and then hide it under a cushion. "Find, find, Frisky!" and Frisk would go about poking his nose into holes and corners, and smelling the ground till, after a minute or two, back he would come with the half-crown between his teeth.

"Fetch master's slippers, Frisk," I used to say, and away Frisk ran to the closet, pushed back the button that fastened the door, with his nose, took up a slipper and brought it to me, and then ran back again to the closet for its fellow.

On one occasion my uncle and a friend were out walking, accompanied by Frisk. They had just got over a stile, when my uncle said to his friend, "We will see presently whether Frisk will be able to find my glove," so saying, he put it on the top of a post by the side of the stile. They then walked on for more than a mile, when my uncle called "Frisk, Frisk, go and fetch my glove." They sat down under the trees, while Frisk, after a sniff or two on the ground, ran back along the path they had just left, and was soon out of sight. He was away a long time, but just as my uncle's friend decided that he must have gone home, and rose up to leave, they saw him come bounding towards them with the glove in his mouth!

One day, as we were out walking, we came to a bridge, when, to my surprise, Frisk turned tail and ran back as fast as his legs could carry him. "Oh," said my uncle, "I wish we had not come this way, for Frisk will never pass this bridge since your brother Edmund threw him over into the canal to make him swim." We had a sad walk home, for my aunt feared greatly that he might be stolen, as he was such a handsome dog. But Frisk was wiser than we took

him to be. He had got safely home, had rested himself after his eight miles trot, and was waiting to receive us as fresh and frisky as ever.

On Sundays Frisk liked to climb up to the top of the garden gate, where he sat very still and very much squeezed together, to see the people go by to church. He never did this on a week day, and how he found out which day was Sunday, I do not know. Perhaps he knew it by the ringing of the church bells.

Sometimes I would show Frisk a bone, and tell him he should have it when I had counted ten. I am sorry to say when I got nearly to the end, I used to count very slowly, and poor Frisky's patience was sadly tried, as he stood quite still, gazing eagerly at the coveted bone. One day I was playing at this game with him in the garden. I had placed the bone in front of him and had counted up to nine, when I thought I should like to see how long he would wait. So I left him staring at the bone, and took a walk about the garden. I roamed about and ate so many apples that I quite forgot poor Frisk. Well, I was going into the house about an hour later, when I caught a glimpse of the dog, fixed on the spot where I had left him, gazing patiently at the bone. "Ten!" I cried out, and the bone was in his mouth in a moment.

THE HOUSE-FLY.

"I WONDER, Mr. Fly, what you will do with yourself now the cold rainy weather is coming on!" exclaimed Charles Long one morning, as he was watching a fly crawling languidly over his slate. "It seems very weak," continued he, addressing his mother, who sat working at the same table. "It has scarcely strength to brush its wings, Mamma. Do you know where flies hide themselves in the winter?"

"I do not think they hide themselves at all, my dear," replied Mrs. Long; "I believe most of them die before winter."

"Oh, Mamma, you *must* be mistaken; where can all the flies come from that we see on a warm sunny day in spring, if the flies die before winter? Do not you recollect seeing hundreds and hundreds appear all of a sudden, just as if they had left their winter holes to enjoy the fine sunshine?"

"Yes, I have observed them in great numbers," replied his mother, "when, perhaps, a day or two before, scarcely one was to be seen; but these flies were not the flies of the last summer."

"Indeed! then where did they come from?"

"From the eggs that the old flies had laid in the autumn. When we observe them for the first time they are enjoying a totally new kind of life, sporting in the air and sipping sweet juices, instead of living half-buried in manure in the form of a shapeless maggot."

"Was a fly ever a maggot?" exclaimed Charles in astonishment. "I know that a butterfly was once a caterpillar; but I thought a fly was always a fly. I have seen very little flies, Mamma, and I thought they grew to be large ones."

"No, they were flies of different kinds, and would not alter in size. The house-fly is generally very common near stable-yards, or coach-stands, because the eggs are laid in manure by the parent fly, as affording the best food for the young maggot when it bursts from the egg-shell. The maggot has no legs, only two little hooks near the head, to assist it in moving, or in securing its position. When it is about to change into a chrysalis, which it does before winter, the skin shrivels, and it becomes stiff and motionless, but the parts within grow every day more and more like a fly; at last, in

the warm days of spring, the skin cracks, and the perfectly winged insect escapes from its confinement."

"I should never have thought that this delicate little fly, with its fine gauze wings, could once have been a maggot," exclaimed Charles, as he examined the fly on his slate more minutely. "Do all kinds of flies pass their young state in manure, Mamma?"

"No; some pass their early life in the seeds of plants, in leaves, mushrooms, and fruits; others live in the bodies of caterpillars and different larvæ, which they entirely destroy; some feed on cheese; those little maggots, Charles, which are generally called cheese-hoppers, turn to small flies; other kinds inhabit muddy waters and marshes, and feed on rotten leaves. Some of these latter flies are particularly curious, being able to support themselves by the tail from the surface of the water, and to draw out their tails much in the same way as you would draw out the tubes of a telescope. The maggots of other flies devour the flesh of dead animals; and in hot countries these are very useful, for, from their numbers, they are capable of consuming a carcass in a very short time, and thus they destroy offensive matter. Have you ever seen the feet of a fly, Charles, through a magnifying glass?"

"No, never, Mamma; I have often looked at the prints of them in the 'Atlas of Nature,' and wished I

could see, in the real fly, the little cushions by which it sticks to the glass; and the tiny hooks which help it to cling in walking on the wall or ceiling; but I thought people could not see them except with grand microscopes."

"You, my dear, or anyone else, can see them, if you wish to do so, with a two-shilling magnifying glass," replied Mrs. Long. "I will lend you my glass, Charles, if you will be careful to return it to me."

"Oh, thank you, Mamma; but how am I to hold the fly steady while I look at his feet?"

"You need not hold the fly; take the magnifying glass to the window, Charles, and watch for a fly crawling on the outside, and then look at it through the pane with the glass."

Charles quickly followed his mother's direction, and, to his great pleasure, soon saw the little fringed cushions or suckers, and the tiny hooks, and also the different movements of the proboscis, which amused him greatly.



FRED'S VISIT TO A COTTON-MILL.

ONE day, soon after his return from Manchester, Fred said to his brother, "Now, George, I have read over my notes on the cotton mill, and I can tell you about my going over it with Uncle Alfred."

"That 's right," cried George; "tell me all aoout it, and don't leave out anything."

"Well, I will do my best, and here are Uncle Alfred's drawings," continued Fred, turning over the leaves of his memorandum-book; "they will help you very much to understand the machinery. When I came home, after seeing the cotton-mill, I wrote down all that I could remember about it; but it was difficult for me to understand all I saw, for there was so much noise that I could not always hear what was said to me.

"The large cotton-mill that I went over is a huge brick building, five storeys high, with great long rows

of windows. I counted fifty-four windows in each row. I found, when we got in, that there were cotton-machines at all these windows, for the factory people want a good light to enable them to see the cotton-threads and to observe if the machinery is working properly. Uncle Alfred first took me to see the men opening the bales of cotton. This was done in a room that was kept quite hot and steamy. Men were unfastening the iron hoops that bound up the bales, and then, as soon as the cotton was free, I noticed that it opened out of its own accord. I was told it had been very heavily pressed for packing by a hydraulic press, so much so, that cotton packed by hand into a box fourteen feet high would be pressed down till it was only sixteen inches high!"

"But, stop a minute, Fred," interrupted his brother, "what is a hydraulic press?"

"It is a press worked with an enormous pressure of water, and not by steam," answered Fred.

At this moment Mr. Harmer came into the room, and George repeated what Fred had told him, about squeezing the cotton into a small-sized bale.

"It is indeed wonderful," said Mr. Harmer, "that the cotton can be pressed into so small a compass. When it is all packed in this way, however, and put into the hold of a ship, great care has to be taken that no water gets to it, for if a ship carrying a full cargo of cotton sprang a leak, and the cotton were to become

wet, it would swell so much that it would break the iron hoops asunder, and would then burst up the deck of the ship!"

"How strange!" exclaimed both the boys.

"It is indeed," replied their father; "but go on with your account, Fred; I shall like to hear it."



Fig. 1.

Fred turned over the leaves of his note-book, and then continued:

"The manager kindly gave me this drawing of the cotton-plant (Fig. 1). He told me that the flower is sometimes of a pale yellow colour, and sometimes pink

and white. On the right-hand side of the picture you see two of the seeds, which are represented larger in proportion than the rest of the plant, so as to make them distinct. He explained to me that the seeds are contained in pods, there being sometimes as many as twelve seeds in one pod. The cotton-fibre is attached firmly to each seed, and when the seed is ripe the shell of the pod bursts open, and the beautiful bunches of fibre appear like soft, fluffy, white balls. The cotton must then be picked at once to prevent its being spoiled by falling on to the ground. The first process is to separate the fibre from the seed; this is called 'ginning,' and is performed in several ways by different machines. One of these 'gins,' as they are called, has a number of circular saws that project a little way through slits in a table. The cotton, with the seed adhering to it, is put on the table, and as the saws revolve they catch hold of the fibre and drag it off the seed; the seed itself is too large to fall down through the narrow slit.

"Another kind of 'gin' has two rollers, one of hard wood, about two inches in diameter, and the other of iron of only five-eighths of an inch. These rollers are placed close together and turn inwards; as they revolve the fibre is drawn in between them, but the seed cannot pass as the iron roller is too small to pinch it; there are also other kinds of gins working in a different manner.

"That 's very curious, Fred," cried George; "but I want to know how the cotton is made into thread."

"I shall come to that presently," said his brother; "but I must explain some other things first.

"When we left the room where the bales of cotton were unpacked we followed the cotton, which was taken in large baskets to the 'openers' or 'beaters,' as they are called. We entered a large dusty room, where there were a great many machines. The noise was quite confusing. There was a loud humming sound, and a noise of beating at the same time. The beating sound was caused by the beating of the 'openers,' and the humming sound was made by fans. The cotton went into the machine through a slit, where there were a pair of rollers to draw it in. Directly it got inside it was beaten violently by iron bars fixed into the spokes of two wheels that turned very fast inside a box. The iron bars beat out all dust from the cotton, and the fans draw away the air from the machine, and thus carry away all the dust through the opening at the top of the machine. The beating of the iron bars also separated the fibres of the cotton very thoroughly.

"Here is Uncle Alfred's drawing. This and all the others represent sections of the machines.

"You must fancy that the long rollers and cylinders are cut through the middle, as you would cut a sausage. In this drawing you will see, George, there are some little arrows to show which way the cotton goes. It

enters at the right-hand side between the two pairs of rollers, and is immediately struck by the iron bars fixed to the quickly-revolving spindle; and any seeds or hard material, or grit, pass through between the bars, while the dust passes upwards through the pipes at the top of the machine, where you see an arrow."

"I see it," said George, as he looked carefully at the drawing; "but, Fred, there is one thing that I

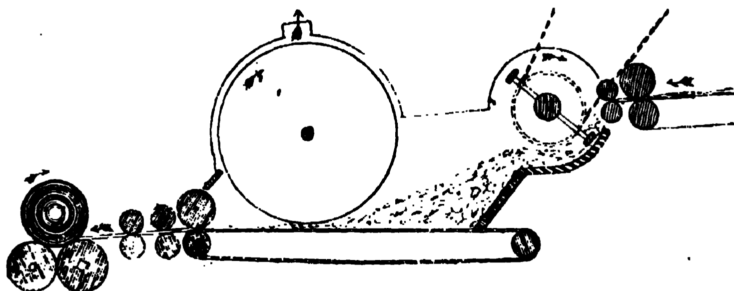


Fig. 2.

want to know. How can the men move away the cotton or do anything with it, when it is in such a loose, fluffy state?"

"That is easily done by the machine," said Fred. "The large roller compresses the cleansed cotton, so that it comes out in a soft flat sheet or 'lap,' as it is called. It is then rolled up by the two large rollers beneath it, which are continually turning round, and so roll it up.

"The cotton now goes to the 'carding engine.' This machine (Fig. 3) has a great cylinder, like a very large garden-roller, covered with fine wire brushes, called 'cards.' It revolves quickly in the direction shown by the arrow. There are also a number of small rollers as seen on the right-hand side; they are covered in the same way; and there is a smooth steel blade that goes

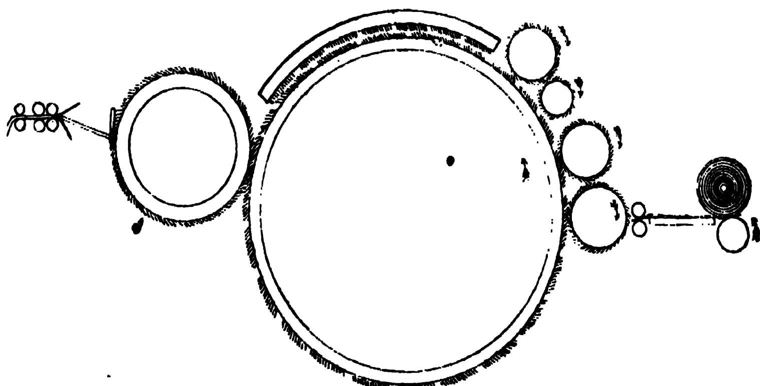


Fig. 3.

up and down very fast, which scrapes the cotton off the last roller on the left-hand side. When the cotton comes out of the 'carding engine' it is in a very thin sheet, and looks like the finest transparent muslin. It is next passed through a very smooth trumpet-shaped hole, and from this hole it comes out looking like a soft untwisted rope. In this state it is called a 'sliver.'

"Uncle Alfred explained to me that the fibre of the

cotton is only about an inch long, and now that it was clean and formed a long line like a soft rope, the object was to make all the fibres lie lengthways, so as to form a smooth, strong thread. It has to be drawn out gradually till it is some hundreds of times longer and thinner, and can be twisted into a yarn or thread.

"When the cotton comes from the 'carding engine' it goes down into a round tin can about as wide as your hat, George, but three feet deep or more; and when the can is full it is taken upstairs in the 'whimsey' to the 'doubling' and 'drawing-machines.'"

"Stop a bit, master Fred," said his father; "you must explain to us what a 'whimsey' is."

"Oh, I forgot, Papa, that you did not know," answered Fred; "it is a lift. I was quite puzzled myself when the Manager said to me, 'Now we will go up in the whimsey, and see the spinning.' I did not know what he meant, but I soon found out, for we all three got into a kind of box; and when the Manager pulled a rope, it began to go up, up quite fast with us. He said the lift was driven by an engine, and was used to carry the men and the cotton up to the spinning floors. I noticed that some of the tin cans of cotton went up with us. When we reached the first floor, the Manager pulled the rope the other way; the lift stood still, and we stepped out just level with the floor. Here the noise was almost deafening till one got a little used to it, and the sight was most curious. I

found myself in a very long room, which occupied the whole length of the mill. It had windows on each side, and had long rows of machines down the centre. There were some hundreds of women and girls at work in this room. I could not see what they were doing at first, but when the Manager asked one of the girls to do her work very slowly, I saw that she was mending the cotton each time she touched it. The machines I saw in the long room were called 'doubling' and 'drawing machines.' They have several pairs of small rollers on the same level (see Fig. 4), the second pair going faster than the first, and the last pair going faster still. Several 'slivers' are put through together between the rollers from the right-hand side, and come out on the left-hand side much thinner than they went in. Then the 'slivers' are put through a second machine somewhat of the same kind, where they are drawn out still further, and are made to look more smooth and regular. The next operation is the one in which the real twisting begins, although they do not yet call it spinning. The machine is called a 'stubbing' or 'coarse roving' machine. The 'sliver,' in passing through it, is still further drawn out by pairs of rollers, and is slightly twisted to make the cotton hold together, and to enable it to bear a further draw-

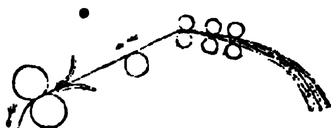


Fig. 4.

ing out. The twisting is done by upright spindles, or rods with holes at the top, through which the 'sliver' enters, and it then passes down an arm in the shape of the letter U upside-down. The spindle with the arm revolves rapidly and twists the 'sliver' just above the top of the spindle. As the twisted 'sliver' comes down it is wound on to a wooden reel or large bobbin on the spindle. The reel is loose on the spindle, and goes round more slowly.

"There is another kind of machine, called the 'throstle,' for doing nearly the same kind of work, that is very similar.

"In this drawing (Fig. 5) you will see the cotton comes down from the large bobbin at the top and passes between three pairs of drawing rollers, then through a hole, and then to the arm or flyer that twists it, after which it is wound on to the bobbin on the spindle."

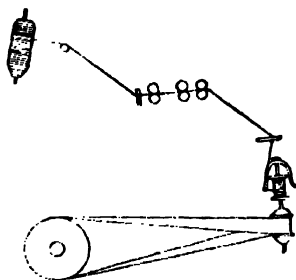


Fig. 5.

"I think I begin to understand your explanations now, Fred," said George. "I suppose the machinery has to do for the cotton what I saw a man doing at a rope-walk the other day. He had a quantity of loose hemp like tow fastened in front of him, and he kept walking backwards and letting the hemp slip slowly between his fingers, whilst a

boy who stood still some way off was making a spindle turn very quickly and twist the hemp into a string."

"You are quite right, George," said Fred; "for the Manager told me that the process of twisting the cotton-thread was very much like that of making ropes at a rope-walk. I wish you could have been with me to see it all. There were machines called 'roving machines' and 'fine roving machines.' Each one draws the cotton out more and more, and gradually twists it tighter. It would not do to twist the cotton too much at first, or it would not draw; it would break. I was told that for weaving calico and ordinary cotton-cloths a single strand (or thread) is used, which is called 'spun yarn'; but for sewing-thread two or three strands are twisted firmly together, so as to form one smooth, hard thread. Sometimes it is drawn through 'dies' to smooth it still further for use in sewing-machines and for ordinary sewing.

"The Manager told me that in some mills they now 'comb' the cotton as well as 'card' it. Cotton that has been combed has a more silky appearance than that which has only been carded. The process suits the better sorts of cotton remarkably well, such as 'Egyptian' and 'Sea Island' cotton, in which the length of fibre is sometimes as much as an inch and three-quarters.

"There are machines called 'mules,' for spinning very fine thread, but I must learn more about them

from Uncle Alfred before I can explain them to you. The Manager told me that a pound of cotton has been spun into so fine a thread that it was a hundred miles long!"

"How wonderful!" exclaimed George.

"It is indeed," said Mr. Harmer. "And I can tell you, my boys, another curious instance of fine, delicate manufacture. An aunt of mine, when she was married, was presented with a beautiful Indian cashmere shawl of the finest texture. This shawl measured four yards square, but my aunt could draw it through her wedding-ring!"

"That was wonderful, too!" cried the boys.

"Fred," said George, "I like hearing about the cotton-mill very much. Are you sure you have told us all that is in your book?"

"Yes," answered his brother; "I have come to the end of my notes on the cotton-mill now. But I must show you my samples of cotton which the Manager gave me from each machine. They are in my box."

"Let me help you to unpack them," cried George, eagerly.

"All right," said Fred; "we will do it at once, and put them among our curiosities."

The two boys went off together.

JAMES FERGUSON.

JAMES FERGUSON was born in the year 1710, a few miles from Keith, a little village in Banffshire, one of the northern counties in Scotland.

His father had a large family, and, being a poor man, was obliged to work hard in order to support them. After a day's steady labour, rest and quiet are agreeable to most men. But he was so fond of his children, and knew so well how useful learning would be to them as they grew up, that when he returned to his home of an evening, instead of indulging in ease, he employed himself in teaching his children to read and write. He took each in his turn, as they reached the age at which he thought it proper for them to begin to learn.

James, however, learned to read before his father thought of beginning to teach him. He used to listen

attentively while his father was teaching his elder brother, and afterwards study the lesson himself. Not to disturb his father, whose time was much occupied, he was in the habit of applying to a kind woman who lived in the neighbourhood, when there was anything he could not understand. With her assistance he learned to read tolerably well.

Pleased at his earnestness and industry in learning to read, his father gave him some further assistance, and also taught him to write; and afterwards placed him at a school at Keith for three months.

When only eight years of age, he already showed a taste for examining machines, and trying to understand their structure; and, with an old lathe and a little knife, contrived to make wheels and other parts of machines.

While still very young, he was put out to earn his own bread; but, being too weak for hard labour, he was employed by his master to watch sheep. He continued at this employment for many years. Looking after sheep, however, was not occupation sufficient for so inquisitive a boy as Ferguson. In the daytime he amused himself by making models of mills, spinning-wheels, and such other things as he happened to see, and at night he studied the stars.

As he grew older and stronger, he was put to harder work, and his hours of leisure were diminished. But still he steadily persevered in his endeavours to make

himself acquainted with everything around him. The difficulties which he had to surmount only made him the more assiduous in seizing every opportunity that was presented to him of gaining instruction. His contrivance for marking down the positions of the stars was very ingenious. He used to go out into the fields by night, when his work was over, with a blanket around him, and a candle in his hand. Spreading the blanket on the ground, he laid himself on his back upon it to survey the stars. He had provided himself with a long piece of thread, upon which he had strung some beads. This piece of thread he used to stretch at arm's length between his eye and the stars, and then sliding the beads along the thread till they hid particular stars from his eye, he applied the thread to a piece of paper, and marked the spots where the beads touched. He continued to do this till he had marked down on his paper the position of a large number of stars. The fair copy of this paper, which he afterwards made, he called his "star-paper."

His knowledge of the stars brought him into acquaintance with some persons who were able to explain many things to him, and to assist him in various ways. From one person he learned that the earth is round; and from others he received a pair of compasses and ruler, and a good supply of pens, ink, and paper. His master, also, was very kind and

considerate, and took so much pleasure in observing Ferguson's proceedings, that "he often," as Ferguson himself has written, "took the thrashing flail out of my hands, and worked himself while I sat by him in the barn, busy with my compasses, ruler, and pen."

Among other things, he made a globe of the earth, from a description which he had met with in a book. He turned the ball for it out of a piece of wood, covered the ball with paper, and then traced upon this paper the different oceans, seas, continents, and islands.

He was now grown into a man, but, owing to his poverty, had many difficulties to struggle with. At one time, by over-working, he fell ill and was obliged to return to his father's house. In order to amuse himself while in this low state, he made a wooden clock, and it kept time pretty well. The substance on which the hammer struck the hours was the neck of a broken bottle.

The clock which he made had a weight and line, and he had no idea how a clock could go without them. It was also a matter of wonder to him how a watch could go in all positions. "Happening," he says, "one day to see a gentleman ride by my father's house (which was close by a public road), I asked him what o'clock it then was. He looked at his watch and told me. As he did this with so much good-

nature, I begged of him to show me the inside of his watch; and, though he was an entire stranger, he immediately opened the watch, and put it into my hands. I saw the spring-box with part of the chain round it, and asked him what it was that made the box turn round. He told me that it was turned round by a steel spring within it. Having then never seen any other spring than that of my father's gun-lock, I asked how a spring within a box could turn the box so often round as to wind all the chain upon it. He answered that the spring was long and thin; that one end of it was fastened to the axis of the box, and the other end to the inside of the box; that the axis was fixed, and the box was loose upon it. I told him I did not yet thoroughly understand the matter. 'Well, my lad,' says he, 'take a long thin piece of whalebone, hold one end of it fast between your finger and thumb, and wind it round your finger: it will then endeavour to unwind itself; and if you fix the other end of it to the inside of a small hoop, and leave it to itself, it will turn the hoop round and round, and wind up a thread tied to the outside of the hoop.' I thanked the gentleman, and told him that I understood the thing very well. I then tried to make a watch with wooden wheels, and made the spring of whalebone; but found that I could not make the watch go when the balance was put on, because the teeth of the wheels were rather too weak to bear the force of a spring sufficient

to move the balance; although the wheels would run fast enough when the balance was taken off. I inclosed the whole in a wooden case, very little bigger than a breakfast tea-cup; but a clumsy neighbour, one day, looking at my watch, happened to let it fall; and, turning hastily about to pick it up, set his foot upon it, and crushed it all to pieces; which so provoked my father that he was almost ready to beat the man; and discouraged me so much that I never attempted to make such another machine again, especially as I was thoroughly convinced I could never make one that would be of any real use."

It is very interesting to follow the progress of this self-taught man. He still continued his practice of star-gazing (as he called it). With his old contrivance of the string and beads he learned to distinguish the planets from the stars. This he considered a grand discovery. This distinction, it is true, had been made long before by others, although he had been ignorant of it; and the discovery, on his part, is a proof of the care with which he made his observations. The stars and planets may be seen shining over our heads by everybody; but how few there are who, like young Ferguson, have had patience enough to mark the situation of the stars and track the course of the planets, even when guided by the instruction and assistance of persons wiser than themselves.

The stars are called "fixed," because, when visible,

they always appear at the same distance from one another. At different hours and times of the year they are to be seen in different directions. They rise, come to the meridian, and set as the earth revolves; but this motion is only apparent, being occasioned by the revolving of the earth. The planets, however, not only have an *apparent* motion like the stars, they have a *real* motion also; and on each succeeding night are to be seen in a different relative position. Young Ferguson examined the stars, night after night. He found that no alteration ever occurred in their distances from one another, but that the planets were so constantly moving as to prevent his marking any particular place for them on the star-papers.

As yet he had not settled to anything by which he might support himself permanently. Neither star-gazing nor clock-making supplied him with bread. He was quite at a loss to determine by what profession he had best endeavour to gain his livelihood. At one time he thought of making himself a painter; and at another, of becoming a doctor. With a view to this latter profession, he even spent two years in studying to qualify himself. His fondness for astronomy, however, again brought him back with redoubled zeal to the pursuit of his early years.

He no longer pursued his former methods. The beads and string were laid aside. Nor was his power of making calculations any longer confined to the

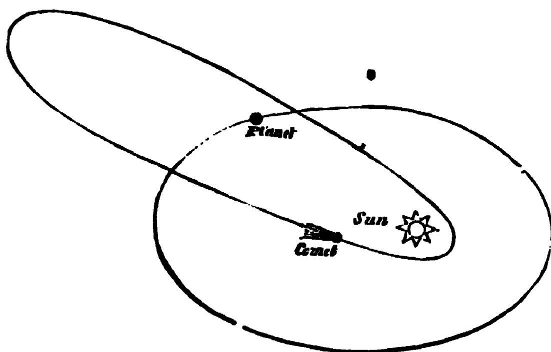
first simple rules of arithmetic. His good conduct had brought him friends, and his friends provided him with every requisite assistance. This was not thrown away upon him. That same application, which in the days of his childhood and youth had enabled him to do so much with little or no assistance, in his riper years, when aided by books, globes, telescopes, and instruments of every description, led him on to the most delightful, although the most difficult parts of astronomy.

His reward for all this persevering application was ample. His character for a perfect knowledge of astronomy, and for skill in explaining to others all those difficulties that he had himself so happily surmounted, spread far and wide. In 1743 he came to London. Scholars flocked to him from all parts; and the most distinguished men in the land crowded to his lecture-room, where they listened with delight, while he explained, to the satisfaction of all, the causes of the succession of day and night, of the seasons, and of eclipses and transits.

Not only had he taught himself how to foretell with precision when eclipses of the sun and moon and transits of the planets would occur, but he could teach others how to make the same calculations. He also explained the nature of comets, which are such objects of terror to ignorant people. He showed that, like the planets, they move round the sun, and

only differ from them inasmuch as at one time they approach much nearer to that body than any of the planets do, and at another time go to a much greater distance.

This little drawing will afford to such of our young readers as have not yet thought upon this subject, some notion of the difference in the path of a comet and of a planet round the sun. One of the ovals represents the path of a planet, and the other the path of a comet.



In this honourable way he spent the remainder of his life, extending his own knowledge, and communicating knowledge to others. He earned sufficient, with a steady economy, to maintain himself in comfort. Painfully had he learned the difficulty of earning, and he prudently limited his wants within his means, laying by while young and in health enough to support himself in sickness and old age. At the same

time, like a truly wise man, he never forgot that the use of money was to increase happiness; and he preferred to make a little money serve his purpose, rather than render his life miserable in the attempt to earn more by sacrificing that portion of his time which he devoted to study and observation.

He died on the 16th of November 1776.

THE WAX-PALM TREE.

"PAPA, you have grown very lazy lately," said little Sophia, climbing upon her father's knee, one day after dinner; "you never tell us any stories now, and you used to tell us many."

"That is true," replied her father, laughing; "but having told you many, I do not know any more to tell."

"Well, then, one of the old ones, Papa; don't think to get off so; for if I really like a story, I do not care how often I hear it."

"Nonsense!" cried her brother Frederick, whom the mention of a story brought from the other side of the room, where he had been teaching his dog Cæsar to jump over a stick. "Nonsense! you would be tired before you had heard one three times, and I can easily prove to you that you would mind hearing the same thing over and over again for ever."

"I did not say *for ever*," interrupted Sophy; "I said *often*."

"You said you did not care how often, and that means the same thing."

"Does it?" said his father.

"Oh! Father, you know very well what I mean. I only mean that what Sophy said about hearing a story over and over again must be nonsense; or else, why cannot she go and read again some of the little story-books that my aunt gave to her last year? She has a whole basket full."

"Oh! brother, but they are for such very little children," said Sophy; "I was so very little last year."

"Well, then, there are papa's books, if you are tired of your own; and as you like reading the same thing over and over again, you may read some of his often enough before you understand them."

"Then had she not better wait a little before she tries to read them?" said his father.

"Yes, indeed, I think so," said Sophy. "Besides, I never said that I preferred to hear the same thing, if anyone would be so good as to tell me something new. And then, too, I said 'hear,' not 'read.' If I read anything that I cannot quite make out, I am obliged to wait, and wait, till somebody will explain it to me, and that is very disagreeable. But I always understand what I am told, because when there is anything difficult I can ask directly, and get it explained in other words. So, if you please, Papa, and if you have time, do tell me something."

"I do please, my little Sophy, and I have time; but what is the something to be?"

"Oh! something wonderful. I like to hear of wonders—that is, real wonders—not such as we meet with in fairy tales."

"And yet," said Frederick, "you like Sinbad the Sailor."

"I used to like it; but then I thought it was true."

Frederick burst into a loud laugh. "Well, I did not think you were such a simpleton. Why, the name might have told you it was not true. 'The Voyages of Sinbad the Sailor; from the Arabian Nights.'"

"But I did not know it was from the Arabian Nights. You know, Frederick, mamma does not wish me to read all the Arabian Nights, only here and there pieces that she picks out for me; and I thought people said, 'Sinbad the Sailor,' as they say, 'Park the Traveller,' and that it meant only that he was famous for making so many voyages, as Park was for travelling so far."

"And a very natural mistake it was," said her father.

"Yes; but then the monstrous things he meets with! Who ever heard of a bird's egg so large that it was mistaken for an island, or of a valley full of diamonds?"

"No one ever heard of these things, certainly, but I and many others have heard of things quite as wonderful, and which, nevertheless, are known to be true," said his father. "If you had read, for the first

time, in the voyages of Sinbad the Sailor, of ships sailing against wind and tide, or of people rising in the air above the clouds, or fetching down lightning from the clouds, or sending messages to the other side of the world in a few seconds—would not these things have appeared to you as wonderful as this valley of diamonds? But to speak of other things, which, though not so wonderful, are still very extaordinary. Did you ever hear of a tree, nearly 200 feet high, growing at the top of a high mountain, and producing wax like bees?"

"No," said Frederick; "and I doubt whether there is such a tree."

"A tree bear wax!" cried Sophia. "Oh, Father, you are laughing at me, because I said I liked to hear of wonders."

"No, indeed, I am quite serious. Did you never before hear of wax being found in plants?"

"No, Papa, never."

"Nor you, Frederick?"

"No, Father, nor I."

"I wish, Frederick, you would run into the garden and gather me a ripe plum."

"A plum, Papa! What for?"

"You will see when you have brought the plum."

"Oh, pray, be quick, Frederick," said Sophia; and Frederick ran off as fast as he could.

"Here is the plum, Papa," said he, returning quite

out of breath, holding the plum in his hand; "but I was in such a hurry to pluck it, that I brushed off the bloom, I am afraid. Are you going to eat it?"

"No. I am sorry, though, that you have brushed off the bloom, because it is precisely the bloom which I want to show you. Let me look at it."

Frederick gave the plum to his father.

"You have grasped it rather roughly, to be sure; however, there is still enough left. Now look at it, my boy, and you, little Sophy; do you see this very fine whitish powder that lies on the surface of the plum, where it has not been touched?"

"Yes, I see it," said Frederick; "but, Father, there is nothing very curious in that; I have seen that thousands of times, and so I suppose has everybody who ever ate plums. I see nothing on this plum that is not to be seen on every other plum."

"Nor I," said his father; "but are you sure that you know what this whitish powder is?"

"What it is? It is part of the plum. Is it not what we call the bloom?"

"It is wax," said his father.

"Wax, Papa, real wax! Do you mean such as the bees make?"

"It is real wax, similar in kind to that made by bees."

"Father," said Frederick, after a silence of some moments, "it is curious, certainly, but not so curious

as I expected. At least I should have thought it much more so if the wax had been in greater quantities, so as to look like wax at once, and not to want so much studying to find it out."

"For your comfort," said his father, "the wax on the tree we were speaking of a little while ago, is to be seen and known as such without much studying."

"I am glad we have got back to the tree again," said Sophia; "I was afraid you had quite forgotten the poor tree. Now do, Papa, begin, and tell us all about it, where it grows, and who discovered it, and first of all what is its name?"

"Its name is '*Ceroxylon andicola*,' or Wax-tree of the Andes."

"I am glad it has an easier name than the first," said Sophia; "I should never recollect that."

"You need not try; you may call it the wax-palm tree. It was discovered by the great traveller Humboldt, and it grows in the upper or higher Andes, which are always covered with snow."

"But that must be a very cold place. I did not know that palm-trees ever grew in such cold places."

"No more did I, till I read Humboldt's travels. In Europe, trees of the palm kind are not found higher up than a thousand feet above the level of the sea. But the wax-palm of the Andes flourishes at a height of nearly three thousand feet. I think I told

you that the tree itself is sometimes nearly two hundred feet high."

"What a tree!" said Frederick; "and is it thick in proportion?"

"By no means; its diameter where it is thickest is little more than a foot; and it stands, like other palms, quite straight up. One of its roots, which are numerous, is thicker than the stem of the tree itself."

"But the wax, Papa; when shall we come to the wax?" asked Sophy.

"I am just going to speak of the wax," said her father, smiling. "The whole length of the stem is marked at certain distances by rings, where leaves have grown, and between these rings is a substance of a yellowish colour and very smooth. This is the wax."

"Real wax, pure wax?" asked Frederick.

"It is, I believe, mixed with a kind of resin; but the inhabitants of the country where these mountains are, consider it as pure wax. They boil it with about a third of the quantity of soap, and make it into tapers, which are used for various purposes."

"And what sort of leaves has this wonderful tree?"

"It has leaves, but not many; not more than ten at the utmost, feathered, that is, resembling feathers in form, and they are sometimes eighteen feet long. They are folded over. The upper side of them is of

a beautiful green, the under is covered with a kind of white scale, which gives a bright silvery appearance to this side of the leaf."

"How beautiful it must be! Has it no flowers?"

"At the base of the leaves, the flowers appear in a cluster on a number of slender stalks; these flowers produce nuts or berries, about the size of a grape, which when ripe are of a fine violet colour. Their skin has a faint, sweetish taste, very agreeable to birds and squirrels. The kernel is wrapped up in a double skin; the outer of a reddish colour, veiny, thick, and easily separated from the nut. The inner skin is very thin, of a pale cinnamon colour, and sticks fast to the kernel. The kernel itself is extremely hard, and about as transparent as horn."

"Thank you, Papa," said Sophy, when her father had ended his description; "but tell us what 'transparent' means?"

"What you can see through, my dear."

"But is this all that you can tell us about this curious tree?"

"All, at least, that would interest you, or that you would understand."

"I understand your description pretty well, Father," said Frederick, "but it would be better if you could show us a drawing—a picture of the Wax-palm tree, as Sophy would say. I think I never saw a drawing of a wax-palm tree."

"Oh, yes, a picture by all means if you have one, Papa," said Sophy.



YOUNG WAX-PALM.

"Run into the next room, and fetch my portfolio, and I will show you a sketch that I made from a print of the Wax palm tree; and when you go to Kew Gardens, you may see a young living plant with all its bloom on the leaves."

"Thank you, dear Papa," cried Frederick; — and away he ran for the portfolio.

When he returned with it, his father picked out the drawing of the Wax-palm tree, and bade them take it into another room, as he had no more time to spare for them.

Then their father began to write, and the children left the room that they might not disturb him.

THE TENT IN THE GARDEN.

"OH! Harry, what *are* you going *to* do?" exclaimed little Clara Markby, as she saw her brother coming across the garden with some large sticks over his shoulder.

"Do be quiet, Clara! Can't you see it is a secret?" cried Harry in a voice so much louder than Clara's that their little brother and sister, Walter and Lucy, jumped up from playing with the puppy and came to see what was going on.

"Come on to the lawn," whispered Harry, "and let us make a tent. Just see what capital poles I've found in the coach-house. Walter, will you fetch some of the cord from the attic? And Clara, do go and ask Sarah to give you two large sheets for the covering, and some strong pins. Come, be quick!"

Walter and Clara ran joyfully off on their separate errands, and Harry ran after them to tell them to be

sure not to let their mother know what they were going to do, as he meant to surprise her when the tent was finished.

Harry then went to the stable, and brought with great difficulty a pair of steps, which he placed against the apple-tree on the lawn. When Clara and Walter returned with the sheets, cord, and pins, they began their tent by driving the ends of two poles into the ground, about a yard on either side of the tree, and fastening the tops to a branch. They then drove two more poles into the ground, about two yards apart and three yards distance from the others, and tied them together at the top, and then laid a fifth pole across all these four poles, tying it with string where it crossed them. Then they stretched the two sheets over this framework and pinned them to the poles down the sides.

The children now rested a minute; for the day was very hot and they had worked hard.

"Oh! what a splendid tent!" cried Lucy, clapping her hands and running inside to enjoy it.

"Yes; but it won't do yet," said Harry. "The sheets are much too thin. What should we do if it rained?"

"I suppose we should go in-doors," said little Lucy, innocently.

"Go in-doors!" cried Harry, disdainfully. "What do you think travellers would do if they made tents

that let in the rain, and then wanted to 'go in-doors?' It is a good thing you are not a man and a traveller as I mean to be, Lucy!" and Harry laughed heartily.

"I don't want to be a traveller unless I may take darling Bobby with me," said Lucy, hugging the puppy, who had waddled after her into the tent.

At this Harry and Clara laughed still more, till Harry exclaimed, "Well, but what shall we cover it with? Let me see——"

"I know!" cried Walter; "I saw some old pieces of carpet in the attic; we could cover it with them and put some on the ground inside."

"Oh; then it will be like a dear little house," cried Lucy. "I wish we could always live in it, except in the winter; because Bobby would like a fire in the winter, wouldn't you, Bobby, dear?"

The children brought the carpets, and covered the tent and the grass inside with them. They then fetched some small chairs and cushions, and sat down, looking proudly round at their work.

"We can't live here always, because I must go back to school," said Harry; "but I wish we might sleep *this one night* here. Don't you think mamma would let us, Clara?"

"I don't know," said Clara, doubtfully. "I should like it very much, shouldn't you, Lucy?"

"Oh, yes," cried Lucy; "it would be so nice to

wake up in the garden with the birds singing, and to be so snug in our dear little tent all the night."

"And if I saw those naughty boys stealing the fruit again, I'd pull them down from the tree, and take them to papa," said little Walter, looking very fierce.

"Well, let's go and ask mamma," cried Harry, starting up; and, followed by all but Lucy, who was afraid her beloved Bobby would run away if she left him, he ran into the house.

Mrs. Markby was in the drawing-room talking to a cousin of the children's, named Norman, who had just arrived to spend a week with the family. The children had not expected him to come till the evening, and they looked at each other with puzzled faces, for they were half afraid of their cousin, who was much older than themselves, and thought he would laugh at their wish to sleep in the tent.

When the children had shaken hands with Norman, Walter exclaimed, "Oh, Mamma, we've made such a splendid tent! I wish you would come and see it."

"We will come willingly when Norman has had some luncheon and is rested. He has had a long journey, and is tired, Walter."

"Oh, thank you!" cried Clara: "and, Mamma, you can't think how warm the tent is."

"Well, then, I am afraid I shall not stay long in it this hot day."

"But, Mamma, I mean it will be very warm at night," continued Clara.

"At night! I hope I shall be sound asleep in my bed at night."

"Oh, yes, Mamma, *you* will, I dare say; but I'm sure, Mamma, if you would let us, it could not possibly hurt *us* to sleep——"

Here Clara saw Norman opening his eyes wide, and looking amused and astonished.

"Well, Clara, what do you want to do?" asked Mrs. Markby.

"You need not laugh, Norman," cried Harry; "you have not seen our tent, or you would be very sorry it is not big enough for you to sleep in yourself." And Harry drew up his head, feeling that after this Norman would not dare to laugh any more. "Mother," continued he, "please don't say 'No' till you have seen our tent. You won't forget to come, will you?"

And with her promise to visit their tent after luncheon, the children returned to the garden, very well satisfied that although Norman had laughed at their wish to sleep in the tent, their mother had not.

The children were fully occupied in arranging the furniture in the tent for the visit of their mother and cousin. First, they put the little round table on one side, then on the other, and, at last, they put it in the middle. Then Clara gathered some of her pret-

tiest flowers, and put them in a little jug on the table, and Walter and Lucy picked some raspberries off their own bush, which they placed on the table also, in a plate borrowed from Jane, the cook. These were to be offered to their visitors when they should arrive.

And now Clara thought of a plan by which the tent could be made much prettier. She obtained from Sarah, the housemaid, a large scarlet quilt, on condition that, in case of rain, it should be brought back to the house. This she spread over the carpet coverings, and the little bright red tent peeping between the boughs of the apple-tree, looked very pretty. Harry also searched for a long time in his drawers and in boxes till he found an old handkerchief which had once been given to him, with the arms of England upon it. This he tied to a stick, and, once more mounting the steps, fastened his flag to the top of the tent.

The children were all ready, Lucy trying to teach Bobby to make a bow, when they heard their mother's dress rustling on the grass, and felt much delighted at hearing Norman remark that "really it was a nice little tent." Mrs. Markby came in, but there was no room for Norman. However, he stood outside with his hands in his pockets, good-naturedly complimenting the children upon their work.

Lucy climbed upon her mother's knee, and, putting her arms round her neck, whispered, "May we all sleep here, just for this night, and Bobby too?"

The children could not imagine why their mother exchanged a smile with Norman before she answered.

"Well, Lucy, you *may* all sleep here, if you will put some more pieces of carpet on the ground and wrap yourselves up warmly, and bring the two little sofas to sleep on. But, remember, you must not trouble Sarah and Jane; you must fetch them yourselves; and I dare say kind Norman will help you."

The children gave a shout of joy, and a shy glance at Norman, who was laughing again! However, he promised to help them, and, with Harry's assistance, brought the little sofas, and placed them in the tent. When he had done so, he exclaimed—

"So you really imagine that you shall sleep here, and not change your minds before night? Shan't you be afraid of bogies?"

"I am not afraid, if you are, Norman," said Harry, a little disdainfully.

"Oh, Norman!" cried little Walter, reproachfully, "you such a big boy, and afraid of bogies! You know quite well there are no such things!"

Norman laughed, and walked away, leaving the children rather indignant, although he had not in the least intended to be disagreeable.

The children made their beds with cushions and shawls. Then Clara and Harry brought their brushes and combs, and a wash-hand stand, all which they knew they should require in the morning. Besides

these, they brought cups and saucers for their tea and breakfast, a loaf of bread, and some butter, and knives and forks, for dinner; because Harry said they could not tell how long they might stay there, and if heavy rain set in they might not be able to return to the house for a week. He almost hoped it might be so, it would be so nice to stay there, and make signals to those in the house—it would be a real adventure.

Harry forgot that there were such things as umbrellas in the world, and that heavy rain never prevented Mr. Markby, who was a surgeon, from visiting his patients.

The little boys and girls thought the evening would never come for them to go to bed. At last tea-time arrived, and they were very happy taking tea in their tent. And now it was half-past eight o'clock, and the children took off their shoes, got into their little beds, and covered themselves with the warm shawls.

"How happy gipsies must be!" exclaimed Harry, as he made room for little Walter by his side. "I wonder people don't always live in tents. Good night all!"

Mrs. Markby now came into the tent, kissed her children kindly, and bade them "good night." She told them that, in case of their feeling cold, they must come into the house at once; and this they promised to do. Mrs. Markby then left them, the children shouting after her, "Good night, dear

Mamma; if we are very comfortable to-night, we hope you'll let us sleep here to-morrow!"

The sun had not long set, so that it was quite light, and the children felt very brave and happy—Lucy perfectly contented, because her dear Bobby lay asleep on a cushion, where she could pat him if she liked. But although the children were quite quiet,—for they wished very much to fall asleep whilst it was light—they were all too much excited to do so at once. And directly any of them dozed off, some slight movement made them aware that they were not in their little beds, in the nursery, but on sofas that were very small for two, and were certainly a *little* uncomfortable. But night now crept on; and as the light slowly disappeared, and the birds left off twittering, the weary children fell asleep.

Suddenly some slight rustle amongst the trees awakened Lucy, who whispered very gently to Clara, "Clara, are you awake? You don't think there is really anything to be frightened at, do you?"

"No, I suppose not," said Clara, opening her eyes; "but I can't think what that noise can be!"

At this Lucy clutched tight hold of Clara, and hid her head under the bed-clothes.

"I dare say it's nothing," whispered Clara, again. "Never mind, Lucy; I'm not *very* much afraid."

"Afraid! who talks of being afraid?" exclaimed Harry, starting up, and, by so doing, pushing poor

Walter on the ground. "I never saw anything like you girls; you never will believe I can take care of you!"

"Because I don't think you can," said Lucy, with a slight tremor in her voice.

"'Don't think I can,' Lucy?" cried Harry. "Well, will you be content if I go and look outside the tent, and see that nothing 's the matter?"

Harry went to the entrance of the tent, but the movement did not increase his boldness. Harry could not see a single light in the house, and the children were so far from it that he thought no cry of alarm could be heard. The garden looked very dark, and where the trees were thickly planted were great black shadows, among which Harry felt sure he saw some one standing. Clara could not imagine why he pulled in his head so suddenly, and jumped into bed so quickly that he nearly pushed Walter out again. When once more in bed, Harry began to think he had only fancied he had seen somebody amongst the trees, and told his brother and sisters all to go to sleep, for there was nothing the matter. The children all lay with their eyes shut a little longer; little Walter, who really believed that Harry could defend him from every danger, being the only one who went to sleep.

After a while the valiant Harry started again from his doze, by feeling something gently touch his elbow.

He held his eyes tight shut, not knowing what monster was near him, when he heard Clara exclaim, half laughing, "Oh, there 's my white pussy walking over Harry! Puss, puss! come here, puss!"

Harry opened his eyes, gave a sigh of relief and a rather dismal laugh, and when the cat had walked out of the tent again, lay still and thought he should now soon be asleep.

In about ten minutes, however, which seemed hours to the children who could not sleep, Lucy whispered to Clara, holding her sister's hand tight—

"Oh, I am so frightened! I wish Harry would let me go into the house. I wish he'd never thought of this tent. Oh, dear! I am so *miserable*." Poor Lucy finished her sentence with suppressed sobs.

"Don't you feel cold, Lucy?" asked Clara. "I do a *little*, and you know we *promised* mamma to go in if we were at all cold."

"I don't know what I feel! I only know I long to be in the nursery, and Harry will be so cross if I want to go in."

"Oh, no, he won't," whispered Clara, who felt very lonely, and began to wonder what they should do if robbers came. "I 'll ask him. Harry," added she, in a louder whisper, "I think we ought to go in, because I am a *little* cold, and I think Lucy is, and we promised mamma, and besides—Oh! do, pray, let us go in!"

Harry might have answered impatiently, but at that instant he was sure he saw through the entrance, which was not quite closed, a faint light, like that of a lantern, coming up the drive: so he answered very quickly—

"Oh, yes, Clara; I think we had better go in. Come, let 's run as fast as we can.

They were all out of bed in an instant; and putting on their shoes, and wrapping themselves in their shawls,—Harry holding little Lucy's hand, who had Bobby under her arm, and Clara following with Walter, —they ran as fast as they could towards the house.

There was only the light of a few stars; so that, in their fright, the children stumbled over objects which, familiar enough by day, looked strange and dark by night. If they had but stayed a moment, they would have seen that Lucy had merely knocked down the garden broom, which the gardener had forgotten to put away, and that Walter had only startled an owl overhead in the lime-tree; but as they ran on, these little accidents made them more and more frightened, and seemed very terrible. At last they reached the hall door, and were rushing up the steps to give a loud knock, when a much worse fear seized them, for they saw a man approaching with a lantern in his hand; and never doubting but that he was a robber, and intended to kill them all, they rushed away screaming —all but Harry. He waited an instant, and then,

seeing the man run towards him, he himself turned, and fled after his brother and sisters. The man pursued him closely, calling out, "I shall catch you this time, my lad." But Harry could run well. He first dashed into the kitchen-garden, and after dodging about behind the artichokes and currant-bushes for some time, made a dart into the flower-garden; and then, leaping over the fence, would have crossed the paddock; but his foot caught and he fell. The man was up in an instant, and Harry bravely exclaimed, as he felt his arm grasped—

"You can kill me, if you like; but don't hurt those little girls and the little boy!"

"Why, Harry, is it you?" cried a well-known voice, and Harry was astonished to recognize in the supposed burglar his own father, who had been visiting a patient, and had taken a lantern with him, on account of the bad roads and the darkness.

"Oh, Papa, I was so frightened; I am so glad it is only you!" cried Harry, drawing a deep breath.

"But how came you all here at this time, Harry? I took you for one of the boys who have been stealing the fruit."

"Mother will tell you all about it; but do let us fetch poor little Lucy; and Clara and Walter must be so frightened."

He ran away after them, and soon little Lucy threw herself crying into her father's arms.

On entering the house, the children were amazed to find their mother sitting at work in the drawing-room, and still more to learn that it was only ten o'clock! Mrs. Markby smiled as the children entered, but did not laugh at their return. Clara, Walter, and Lucy ran joyfully off to their soft beds in the pretty little nursery; but Harry lingered a minute behind.

"Mamma," said he, "you don't look a bit surprised at our coming back!"

"Because I am *not*, my dear."

"Well, but Mother," continued Harry, playing with the door-handle, "I don't believe I should have come back if I had not seen papa's lantern. Besides, I am sure that before that I saw someone among the trees."

"Well, Harry, *I* saw you peep out of your tent, for Norman and I were walking in the garden, and stayed near you to listen whether you were all quiet and asleep or not."

"Oh, Mamma, that was very kind of you; but if I had not seen Norman——"

"You would all have come in to your comfortable beds for some other reason, I think," said Mrs. Markby, with a kindly smile. "But never mind, Harry," she continued; "your father and I like to see you try your powers as you have to-night, and we shall remember with pleasure your brave little speech.

to your father when he and you thought each other a robber."

Harry judged, by what his mother said, that she had not given up all hopes of his becoming a traveller; so he kissed her affectionately, and wished her good night. The children were all so much tired that they soon fell asleep. To be sure they rather dreaded meeting Norman at breakfast, but they knew him to be really good-natured, and they were so glad to be once more in their comfortable beds, that they easily made up their minds to bear a little laughter.

Carrier and Wild Pigeons.

"I HAVE had such a pleasant day, Mamma," said Charles Long, as he entered the parlour where Mrs. Long was sitting; "I have been ever since breakfast with Fred Lawson. You cannot think what a great many entertaining things there are at his house."

"Then, I suppose you have been in Mr. Lawson's fine poultry-yard, Charles," said Mrs. Long.

"Oh, yes. We fed the fowls, and the geese, and the pigeons, and the ducks, and the rabbits, and we cleaned the rabbit-hutches. We have been so happy! I wish you had been with us, Mamma."

"And so do I, my dear," answered Mrs. Long; "but when your papa told me that he intended to take you to Mr. Lawson's I was engaged, and I did not like to detain you till I was ready. You say you fed the pigeons. They are a new addition to the poultry-yard. Has Mr. Lawson many?"

"Yes; and they are such beauties! Some of them have colours on the breast and throat like the peacocks. But I liked the carriers best of all. Mr. Lawson has three of them. Do not you recollect, Mamma, the story of the 'White Pigeon'? Ever since I read it I have wished very much to see a carrier pigeon."

"Are they different in appearance from the common tame pigeon, Charles? I have never seen any of them."

"I could not, at first sight, know the carrier from a grey-coloured tame pigeon; but Mr. Lawson showed me a broad circle of bare white flesh round the eyes of the carriers, by which, he said, you may always know them. He sent one of his carriers to Ramsgate, and will you believe it, Mamma, it flew all that long way, more than seventy miles, in two hours and a half!"

"I can easily believe that, Charles," said Mrs. Long, "because I have heard of large flocks of pigeons that travel at a much greater rate, passing over a distance of between three and four hundred miles in six hours; that is, about a mile in a minute."

"Three or four hundred miles in six hours!" exclaimed Charles; "what famous carriers they would make! They would fly from one end of England to the other between our breakfast and dinner."

"They would certainly be able to do so," said Mrs.

Long; "but, remember, I am speaking of a foreign pigeon in its wild state. I have never heard of tame pigeons flying so quickly. Where did Mr. Lawson procure his carriers?"

"He bought them last spring when he was staying at Ramsgate," said Charles. "Fred told me they were brought home in a bag, and that his father let one of them fly a few days after their arrival. He said that the pigeon flew up to a great height, made two or three circles in the air, and then darted off to its old home at Ramsgate. How could it know the proper direction, Mamma? It had never even seen the way."

"Indeed, I do not know," said Mrs. Long; "nor do I think that anyone is acquainted with the method by which birds and animals find their way in so surprising a manner. Do you know where the wild pigeon builds its nest, Charles?"

"Yes; I think you showed me last summer, Mamma; on the branches of trees in a wood, just where two branches meet. Their nests are made of sticks and twigs laid almost flat. I wonder the young ones do not fall out."

"I am not surprised, Charles," said Mrs. Long, "that you should mistake those nests for the wild pigeon's. They were the nests of the *Ringdove* or *Woodpigeon*, which, though a much larger bird than the wild pigeon, a good deal resembles it. The wild pigeon, which of all pigeons is most like our English

tame pigeon, builds its nest in the holes of rocks and old towers, and in the hollows of trees."

"Mr. Lawson showed me a pair of ringdoves, Mamma, that he is trying to tame," said Charles, "but he says he does not think he shall be able to tame them, they are so very wild. They are much larger than the other pigeons, and are very fierce and quarrelsome. I saw the white mark round the back of their necks, just like a ring; but Mr. Lawson did not tell me they were called woodpigeons as well as ringdoves. What pretty creatures pigeons are! They look so clean, and their feathers are so soft. I wish I might keep pigeons, Mamma."

"I am afraid we cannot allow you to do so; we have no suitable place for them, and I do not like to keep animals of any kind unless I can make them quite comfortable. Did you observe the pigeons drinking, Charles?"

"Yes, Mamma, I did; but I should not have taken much notice of it, if Mr. Lawson had not told me to watch the fowls drinking at the same time; and then I saw that pigeons did not sip and rest, and sip and rest again, like the fowls, but that they drank a great deal at a time, like a horse or a dog. I think all other birds that I have seen drinking sip like the fowls, throwing their heads back every minute. What do you think, Mamma?"

"I am not sure that all other birds drink in that

manner, but I believe it is the general habit," said Mrs. Long. "Pigeons, I know, are remarkable for drinking in a continued draught, like quadrupeds. Did Mr. Lawson tell you anything more about pigeons?"

"Yes, he told me a great deal about them," said Charles. "He showed me the two white eggs which one of the hen pigeons had laid; and he said that both parents assist in hatching them and that both help to feed the young ones. Then, Mamma, the young are not fed, at first, on the same food as the old ones, grain and seeds; but on a kind of curd that the parent birds can throw up from their stomachs. For three or four days the young pigeons take this food only; then the old birds mix it with seed, and at the end of eight or nine days the young eat the same food as their parents. Mr. Lawson told me that a great number of the wild pigeons and doves leave this country in the spring. Do they go to warm countries, like the swallows?"

"No, my dear; they choose Norway and Sweden for their summer abode. These are much colder countries than our own, except for a very short period. There are, however, many pigeons that stay the year round with us; although the chief of them migrate and return in the autumn. I do not know whether they leave Norway and Sweden because of the severity of the winter, or for some other reason. Pigeons are found nearly all over the world; in some

of the colder countries to the north, as well as in milder climates."

"Mr. Lawson said, Mamma, that there was a pigeon in America, called the passenger-pigeon, which is seen in such great flocks as to darken the air. Do not you think that he must have made a mistake? You know, Mamma, there must have been thousands and thousands of pigeons flying almost close together, to have hidden the light."

"Indeed, Charles, I should have thought it very improbable," said Mrs. Long, "had I not read several accounts of these wonderful flights, by observers whose word cannot be doubted. A celebrated naturalist, Mr. Audubon, describes one flight alone as consisting of many millions. He was once travelling in America, when he attempted to reckon the flocks that passed over his head, by making on a card a pencil dot for every flock, but this he found was impossible: flock followed flock so quickly. The air became darkened, though the sun was shining brilliantly at the time; and this prodigious flight of birds continued for three days! Now, as these are the pigeons that fly a mile in a minute, the number that passed in those three days must have been far greater than either you or I can imagine."

"Oh, Mamma, where could they all have found food? I think the farmers must have been quite frightened."

"The corn-fields do not suffer as you suppose, Charles," said Mrs. Long, "for the passenger-pigeon feeds principally on beech-mast, that is, the seed of the beech; and there are immense beech forests in America. The passenger-pigeon affords excellent food, and has sometimes been almost the only provision for whole armies. They are killed not only for their flesh, but for the sake of their fat, which, when melted, is used by the Indians instead of butter, and, in some parts of the country, by the Americans also."

"How do the people kill them, Mamma? Do the pigeons fly low?"

"Sometimes, and they can then be easily shot or knocked down with sticks. They are also caught in large nets stretched on the ground, a tame pigeon being employed to entice them to enter. But they are generally procured in a different way. The inhabitants know that they roost in the forest, and bring up their young there. The passenger-pigeon builds the same kind of nest as our ringdoves, but lays no more than a single egg at one hatch. The pigeons will occupy whole forests of forty miles in extent while engaged in rearing the young birds, and the ground becomes covered with branches of trees broken down by the weight of the birds clustering so closely together. When the people imagine that the first brood is nearly fledged, they move in large par-

ties to the neighbourhood of those forests which the birds are known to frequent, taking with them waggons, axes, beds, cooking utensils, and sometimes their children. The noise in the woods at that time is so great as to terrify the horses, and it is with difficulty that one person can be heard by another, except by bawling in his ear. The men with their axes cut down the trees that seem to be most crowded with nests, and contrive so that as they fall these trees may knock down other trees. The tumult of the pigeons' wings sounding like thunder, mixed with the frequent crash of the timber, is described as truly wonderful.

"Then, besides these sounds, there are the cries of eagles, buzzards, and hawks, which sail about and drag the young pigeons from their nests; and the delighted grunt of herds of hogs which are feeding on the broken eggs and the young birds that have fallen from their nests. One tree will often produce above a hundred nests, and the young birds are almost one lump of fat, so that in a short time a very large quantity of oil is obtained."

"Where did you learn all this, Mamma?" said Charles. "It must be a very interesting book, I think."

"I found most of the information, my dear," answered his mother, "in a book called 'Wilson's American Birds.' If you like I will borrow it for

you, for I have not the book. There are many parts of it which you would both understand and like."

"Was Mr. Wilson an American, Mamma?" said Charles.

"No; he was a Scotch weaver, very poor, and with few friends to help him, Charles; and, therefore, though he was remarkably fond of reading, he found great difficulty in obtaining books. Still he took such pains, when he was a boy, to examine every living object around him and to study its habits, that he acquired far greater knowledge of Natural History than those who have hundreds of books in their possession, and yet make but little use of their eyes. When he went to America, he determined to make himself acquainted as well as possible with the American birds, in order to increase his own knowledge, and also that of others. Now Wilson knew that no written description could give an accurate idea of new kinds of birds to those who were ignorant of them, and he, therefore, at forty years of age, set about with great perseverance to teach himself drawing. He travelled seven years over a great part of North America, wandering alone many thousands of miles, minutely describing the birds he met with, and drawing their forms. He has added to the knowledge of American birds far more than any other person."

"I wish you had the book, Mamma," said Charles;

"I like to read things just at the time I want to know about them, because I sometimes forget to ask afterwards. But I will not forget this time, if I can help it. You are taking out your desk, Mamma; I hope you are not going to write."

"Yes; I am obliged to write a letter, my dear, so I must beg you not to interrupt me," said Mrs. Long.

"Then, Mamma, I will get the glue-pot and mend my broken cart," said Charles.

"Take care of my carpet and table, if you please," said Mrs. Long.

"Yes, Mamma; I have a small deal board that I will place the glue-pot on. I will carry it from the fire very carefully."

Mrs. Long then wrote her letter, and Charles occupied himself till bed-time with his cart.

THE ELECTRIC TELEGRAPH.

"HERE is good news," said Mr. Robson to his wife, upon receiving a message by electric telegraph; "my agent sends word that I shall not be wanted in Edinburgh before next month."

"Oh! Papa," said his son James, a boy of thirteen, "how glad I am that you will not leave home until I go back to school: what a capital thing the electric telegraph is, to bring us such famous news!"

"Yes," replied his father; "had my agent written by post, the letter would not have reached this house before to-morrow at noon, when I should have been nearly at Edinburgh. But, by means of the telegraph, the news I have just received, which left Edinburgh at half-past five o'clock this afternoon, reached the telegraph office in the High Street at eighteen minutes to six; so that the message has travelled more than four hundred miles in *twelve minutes.*"

"How wonderful?" said Mrs. Robson; "though to be sure a telegram came to us last week from Birmingham in four minutes."

"Yes," said Mr. Robson, "that is true. Of course in both cases a little time has been taken up in con-

veying the message by hand from the office in the town to our house, half a mile away. But, James," he continued, "should you like to see and understand the apparatus which works these wonders?"

"Beyond everything, Papa; I should be more delighted than I can tell you."

"Then get ready, and we will walk to the Telegraph Office, where we shall find my friend Mr. Carr, the superintendent, who has often promised to show me the telegraphic instruments."

James was ready so quickly that his father smiled at his impatience; and in a few minutes they set out for the Telegraph Office. The superintendent was in his private room when they arrived, and, after a short delay, gave orders for their admittance.

"You have chosen a good time for your visit," said Mr. Carr; "my clerks have just received the foreign intelligence for the evening newspapers; so that it was only necessary to keep you waiting a few minutes. You see," he added, with a smile—"as we have all kinds of secrets passing through the office, from the nomination of a Prime Minister down to the price of potatoes, we cannot admit any strangers until the business of the day is nearly over.

"I think," continued Mr. Carr, "I will first explain to you the apparatus in which the electricity is created. There are many forms of battery, but I will explain the simplest kind—called a galvanic battery—after the

inventor, Galvani, an Italian, who lived in the latter part of the last century. You must know that to produce galvanism (one kind of electricity), it is necessary partially to insert two metals, such as copper and zinc, in a solution of acid, and to connect the upper edges with a strip of metal or wire. See! here is a sketch which will more clearly show my meaning.

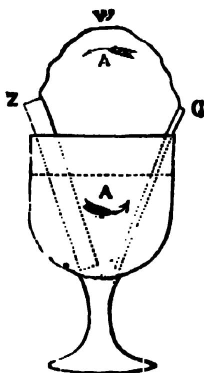


Fig. 1.

G, a glass vessel partly filled with diluted acid (acid and water).

C, a plate of copper.

Z, a plate of zinc.

W, the wire connecting the plates.

AA, arrows, showing the direction in which the electricity travels.

"The instant the plates are connected by the wire a current of electricity flows unceasingly from the zinc plate through the acid to the copper plate; returning, by means of the wire, to the zinc plate. Whether the connecting wire be a foot or a thousand miles in length, the principle is the same; since electricity travels at the rate of 288,000 miles a second, its passage is practically instantaneous. When the wire is very long, the effect, however, is not so great as when it is short. The conducting wire offers resis-

tance to the passage of electricity, increasing with distance; although the resistance of thin wires is less than of thick ones.

"This is a battery the power of which can be increased at pleasure by enlarging the size and number of the pairs of plates. I can make you aware, Master James, even by *taste*, of the existence of the electric current; for you can make a little galvanic battery in your own mouth."

"In my own mouth!" exclaimed James. "How is that possible?"

Mr. Carr replied, "You shall see"; and giving James a penny and a half-crown, he told him to place one above and the other under his tongue, and then to bring the two edges of the coins together, and keep them in that position for some little time.

James did so; and said, as he removed them, that there was a disagreeable taste, unlike anything he remembered.

Mr. Carr said this taste arose from the passage of electricity from one metal to the other; and that the moist tongue had served for the acid of the battery.

"That is very curious," said James. "But how, Sir, do you make the electricity in your battery convey a message?"

"Very readily," replied Mr. Carr; "you have seen the needle of a mariner's compass, have you not?"

"Oh, yes; it is a steel needle, rubbed with a magnet or loadstone, and nicely balanced on its centre."

"Just so; now, Professor Oersted, of Copenhagen, found out, in 1819, that if such a needle were suspended over a wire, along which a current of electricity from a battery was passing, the needle would be compelled to turn to the right or the left across the wire, according as the electricity was sent in one direction or the other. See," continued Mr. Carr, "here is a diagram of the arrangement we make use of, and which I think you will understand.

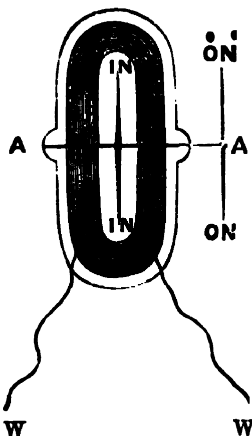


Fig. 2.—Side View.

C W, 200 or 300 yards of fine copper wire, covered with silk coiled round an ivory hollow case.

I N, inner needle.

O N, outer-needle or pointer.

A, axle on which needles are mounted.

W W, ends of the coils of wire.

"Around the hollow case there is a coil of fine copper wire (the object of the coil being to increase the effect), and through this is passed, as shown in Fig. 2, a delicate steel axle, bearing two steel needles; it being intended that the inner needle shall be acted upon by the galvanic battery, and that the outer one shall serve as a pointer, to follow the motion of the inner needle. You must understand that this thin ivory case is simply to support the wire, and to allow of the wire being coiled very close to the inner needle without actually touching the needle; but the case need not be made of ivory; any contrivance which would keep the wire in a coiled form, and free from the needle, would answer the purpose equally well."

"But why are the needles not hung horizontally, like the needle of a mariner's compass?" asked Mr. Robson.

"We arrange them vertically," replied Mr. Carr, "for the sake of more conveniently observing their movements; and we make the lower ends slightly heavier, so that the needles may, after a movement, the more readily recover their upright position. But to proceed with my explanation: you remember I told you that the galvanism flows from the *zinc* to the *copper* plate?"

"Yes," said James; "and you also told us that there must be an unbroken communication between

the upper edges of the plates, however long the line of communication might be."

"Quite right. Now, 'see, I have here a working model of the diagram. I have joined the wire from

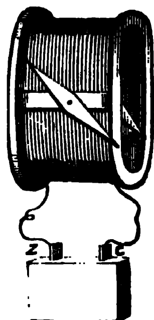


Fig. 3.

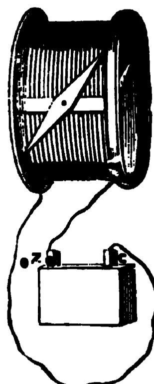


Fig. 4.

the copper plate to the *right-hand* end of the coil of wire; and, observe, the instant I connect the zinc plate with the *left* or remaining end of the wire, the electricity, rushing through the coil from right to left, acts upon the magnetized inner needle, and compels it to point to the left (Fig. 3). Now, when I reverse the connection—that is, place the *right* end of the coil in communication with the zinc plate, and the *left* end with the copper plate—the fluid travelling from *left* to *right* causes the needles to point in the opposite direction (Fig. 4)."

"How curious!" exclaimed James; "but, pray, tell us how the galvanism or electricity, without passing through the needle, causes it to move."

"It is supposed," replied the superintendent, "that the electricity, passing through the copper wire, converts the coil into a magnet, which attracts or repels the needle, according to the direction taken by the current. There are, also, other reasons given, which are too difficult for you to understand."

"In a thunderstorm," inquired Mr. Robson, "does the lightning affect the needles?"

"Yes," said Mr. Carr, "seriously. And for that reason we now use an improved form of needle-coil, which cannot be, as we term it, demagnetized. But the old pattern I have just shown to you is easier to explain."

"But, pray," said James, "how do you make a needle move at a distance? I cannot understand that."

Mr. Carr smiled. "Nothing more simple, my young friend. Look at this sketch. A, B, C, D, repre-

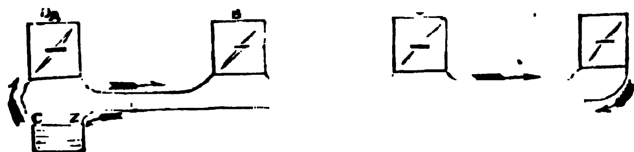


Fig. 5.

sent coils of wire—say at London, Birmingham, Manchester, and Liverpool—fitted with proper needles. The left side of the London coil (A) is joined to the

copper plate of the battery; the right side of A is connected by one of the wires which you see on the railway to the left side of coil B; the right side of B to the left side of C; the right side of C to the left of D; and the right of D to another wire, which runs, without interruption, from Liverpool to the zinc plate of the battery in London. Thus, you see, a complete circuit of four hundred miles of wire, commencing at the copper plate, and terminating at the zinc plate, is established, having four coils or stations as part of the circuit. Now, as the current is rushing through this circuit from London to Liverpool by the upper wire, and back to London by the lower wire, we see that all the needles point to the right (Fig. 5).

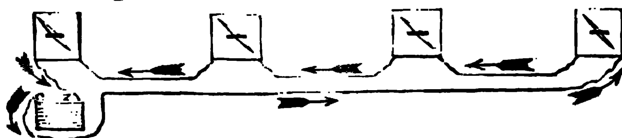


Fig. 6.

"But, reverse the communication, as I showed you before, and the current travels to Liverpool by the lower wire, returning by the upper, and thus reverses the direction of the needles (Fig. 6). If we withdraw the battery altogether, the needles stand upright." (Fig. 7.)



Fig. 7.

"But," said Mr. Robson, "how do B, C, and D manage to move their own needles, or the needles at each other's stations?"

"There is a very simple mechanical contrivance," replied Mr. Carr, "attached to each instrument, by which the battery can be brought into use at the various stations when required; but otherwise the wires are left free for the passage of signals along the whole line, which could not be the case if the battery at any intermediate station was kept in constant connection with the wires. All the needles along the line would perpetually point in one direction, and the communication would, of course, be stopped."

Mr. Carr then led them into a room in which, ranged upon long tables, were a great many curious instruments, with mahogany cases, brass fittings, and green dial-plates, bearing the letters of the alphabet, arranged on either side of an upright pointer or needle. Clerks were reading messages from the vibrations of the pointers; some were seated before an apparatus made of brass from which a paper slip or ribbon was unrolled with great rapidity. Other clerks appeared to listen with close attention to the taps of a little hammer enclosed in a box. Altogether James thought the sights and sounds were most puzzling.

Above the instruments were cards bearing the words, "To Carlisle, Edinburgh, and Glasgow"; "To Man-

chester and Liverpool"; "To Derby, Leeds, York, and Hull," &c., apparently indicating the towns with which the instruments were directly in communication.

"I must tell you," said Mr. Carr, "that when I was first appointed superintendent, the only instrument

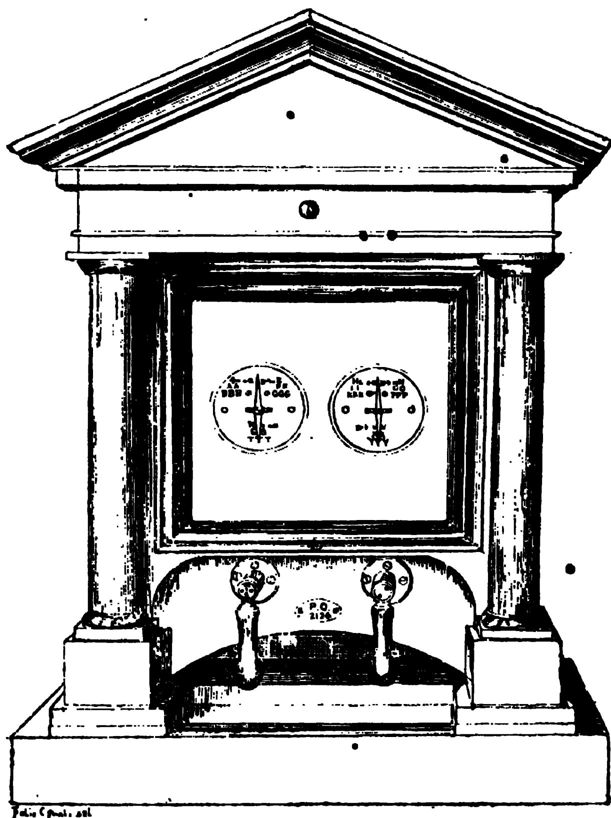


Fig. 8.

in use was the double-needle telegraph, invented by the late Sir W. F. Cooke and Sir Charles Wheatstone. Here is one which we keep as a curiosity, but it has quite gone out of use."

This was a very handsome apparatus in a polished rosewood case. It had two pointers, and, Mr. Carr said, required two wires. He explained that the telegraph with one needle could be worked with one wire from point to point; this last was a cheaper arrangement.

"That," continued the superintendent, pointing to one of the instruments in use, "is a single-needle telegraph. It is really one half of the old double-needle, and is very simple and serviceable. Sometimes it is worked with what we call a drop-handle, such as those you see in Fig. 8; but the general plan is to use a pair of tappers, otherwise known as "keys." But they are not in the least like common keys. By moving the drop-handle to the right or left, or by pressing one of the two keys, the battery, until that moment unconnected with the instrument, becomes connected with the wire of the main line; and the electricity flowing through the coil, causes the needle to move to the right or left. You will understand this better, if you look again at Figs. 5 and 6, which show the battery in action."

At this moment the needle or pointer on the green dial commenced a variety of movements, which fol-

lowed each other so quickly that James found the rapidity quite bewildering.

"That," said the superintendent, when the motion ceased, "was a message passing through for Kidderminster."

"But how did you know it was not for you, since you could also read the message here?" asked James.

"Because, before a message is commenced, a signal is given to show for which office on this line of wire it is intended, and from which office it is about to be sent. But now I will ask the clerk at Reading to go through the alphabet very slowly, that you may see how we communicate by signs."

In less than a minute, to James's astonishment, the request was made and agreed to, although the town of Reading was many miles distant.

"But, before he commences," said Mr. Carr, "let me give you a word of explanation. The short sloping mark under each letter, painted on the dial, means a movement to the left if you find it on the right-hand of the pointer, or a movement to the right if found on the left-hand."

With this preface, Mr. Carr gave the signal to Reading, "Go on"; and, to James's delight, he saw the needle beat once to the left and once to the right (A); then once to the right and thrice to the left (B); then left and right, left and right (C); next once to the right and twice to the left (D); the needle obeying

the electrical impulse from Reading, while no one touched or even stood near it.

James observed that he thought the letters must puzzle the clerks, as the movements seemed so difficult to follow. But Mr. Carr said the eye soon became accustomed to such movements, however difficult they might appear.

Meanwhile the alphabet went on; James finding out, with the help of Mr. Carr, that one beat to the right-hand meant (T), two beats (M), three (O), and four (CH); while in the opposite direction, *i.e.*, to the left-hand, one beat meant (E), two beats (I), three (S), and four beats the letter (H). Other letters he found were signalled by means of a combination of some of these movements.

When the alphabet was completed, Mr. Carr thanked the Reading clerk for his attention, and the clerk replied that he was happy to do anything that Mr. Carr wished.

"What happens," asked James, "if a word is telegraphed which the clerk trying to read cannot make out?"

"Ah, that is a sensible question," observed Mr. Carr. "Well, the puzzled clerk returns what is called the 'not-understand' signal—the letter E; that is, he makes the Reading needle point once to the left-hand. Then the Reading clerk knows that his distant fellow-clerk has not read off the last word; and he spells it

over again. If, however, the word is understood, the clerk at the distant office sends back T, meaning thereby, 'I understand—go on'; if, however, he still feels a doubt about the word just signalled, he repeats the E, meaning, as I explained just now, 'spell the word again; I do not understand it.'

"But I must tell you of a plan devised by a clever man for making it easy to learn how to telegraph. He composed a sort of proverb for each set of signs, whether to right or left. One proverb I recollect. The letters T, M, O, and CH are signalled, as you saw, by strokes to the right-hand. So the group was to be remembered thus:—'(T)urnips (M)ake (O)xen (CH)eerful.'"

Mr. Robson smiled, and James laughed outright.

"Then you do spell every word in full?" inquired Mr. Robson.

"Every word; but such is the rapidity with which experienced clerks can read the signals that, under the old plan of using two needles, my chief clerk, Mr. Evans, has deciphered, upon extraordinary occasions, 600 beats of the needle per minute; or at about three times the rate of ordinary writing."

"Do not telegraph clerks often mistake one signal for another?" asked James.

"Not often. Of course, at times, an act of carelessness may occasion a mistake; but with careful and experienced clerks errors are of rare occurrence. I

recollect an amusing blunder (if we may venture to consider telegraphic errors as amusing) which once happened:—A few years ago, a barrister on the Northern Circuit, starting upon his journey, forgot to take with him his wig. Upon his arrival at the town where the judges held their court, he discovered his omission; and, therefore, at once telegraphed to his clerk that he had, by mistake, left his wig locked up in the strong-room. This was at the time when the double-needle system was in use; and the letters F and E closely resembled G (two beats for F, and one for E, with a pause between them; while three beats one after the other, without a pause, meant G). Well, as ill-luck would have it, the letter G was imperfectly signalled; and the word 'WIG' read off 'WIFE'! You may imagine the amazement of the lawyer's clerk, to whom the message was delivered, who thought, no doubt, until the ludicrous blunder was cleared up, that either his master had taken leave of his senses, or that his wife was spending a doleful evening in the strong-room!"

Both James and his father laughed at this anecdote.

"Now," said Mr. Carr, "I have several other instruments to show you—the bell, the Morse printer, and the sounder. The bell telegraph was invented by Sir Charles Bright, who was one of the chief persons engaged in laying the first Atlantic telegraph cable, and his brother, Mr. E. B. Bright. So it is

called the Brights' Bell Telegraph. It is read by sound and by means of two little hammers striking one or other of these two little bells. A single tap on the right-hand bell means (T), and a tap on the left (E), just as the needle moving to the right or the left signals those letters."

"I think I should like to manage this telegraph better than the other," said James, who clearly preferred the tinkle of the bells to the silent movement of the needle.

"Let me show you the sounder," said Mr. Carr.

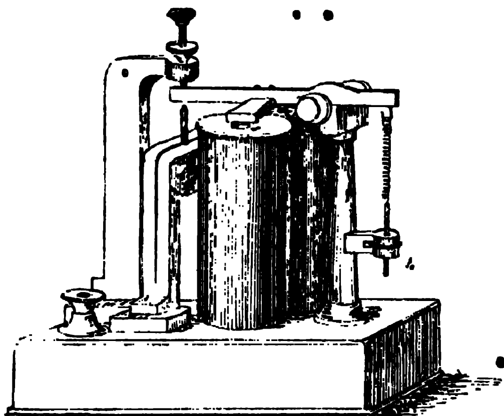


Fig. 9.

"This is an American invention. A single hammer taps on a single bell or little block of metal. A quick tap means (E), and a slower tap (T), and the ear must learn to know the difference between quick taps and slow ones."

"Dear me!" said James, "I should not like that at all. It would be very hard to learn, I should think."

"Not as hard as you suppose; come here, Pettifer," said the superintendent, calling to a disengaged clerk. "Ask York if there is anything new to be seen in the old city."

The clerk spoken to by Mr. Carr industriously worked the short lever, known as a "key," of the small instrument before him, and almost immediately the sounder began, apparently of its own accord, to hammer out a reply. The sounds seemed to James all alike, and to follow each other so quickly as to give him no chance of making out which were long and which short sounds.

Tick tick (I) tick tick tick, tick, tick (SEE) tick tap (A) tick tap tick, tick tap, tick tick, tap tick, tap tick tick tick, tap tap tap, tick tap tap (RAINBOW). Then followed many more ticks and taps.

"What says York?" inquired Mr. Carr.

"His words are," the clerk replied, "'I see a rainbow over the Minster.'"

"All done in less than a minute," said Mr. Robson. "That is very quick work."

Mr. Carr then proposed to explain the nature of an electro-magnet; because the principle of the Bell, the Sounder, and the Printer were the same, and had to do with electro-magnets, and not with magnetic needles.

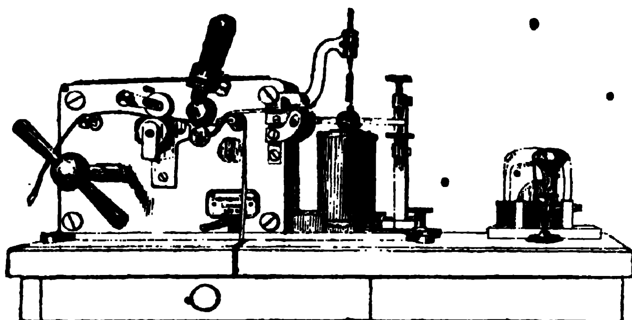


Fig. 10.

"Steel, once magnetized," Mr. Carr said, "remains so for a long time. Iron may be temporarily magnetized; that is, made to attract other iron, but it remains so only as long as the means of magnetizing continue to be applied. Take a short piece of pure iron, say, of the size of the bobbin of a reel of cotton. Wind around it fine silk-covered copper wire, leaving both ends of the wire free. Now connect the two ends with the zinc and copper plates of a galvanic battery. The iron is then magnetic; disconnect the ends, and the iron is no longer magnetic."

"How is this wonderful principle applied to the Sounder and other instruments?" inquired Mr. Robson.

"I will explain," replied Mr. Carr.

"Next to what I will still call the cotton bobbin is placed the lever, which acts as a hammer or clapper to the bell. It is furnished with a little spring. When

the bobbin becomes a magnet the lever is drawn down to it, and the other end flying up strikes the bell. As soon as the electric current is withdrawn from the bobbin the iron within ceases to attract, and the little spring draws the lever back into its old position."

Mr. Robson was anxious to know how the electric current was sent into the bobbin and cut off from it.

Mr. Carr explained. "It is done," said he, "by this tapper, which we call a 'key.' If the key is pressed down for an instant the bobbin is magnetized for an instant; because the key, being released, springs up again, and the supply of electricity is cut off."

"I see," exclaimed James. "If you press the key down for half a second the bell gives out a quick, sharp sound, and if pressed down for a whole second, it gives a longer, slower sound."

Mr. Carr was pleased with the intelligence shown by James, and he went on to observe: "The quick, sharp sound (tick) would be E, the long, slow sound (tap) T, the quick followed by the slow (tick tap) A, and the slow followed by the quick (tap tick) N. The codes of all these systems," continued the superintendent, "are the same. The beat to the left of the single needle is the dot or short mark of the printer or ink-writing telegraph, and the tick or short sound of the sounder or the stroke of the left-hand bell of Bright's Bell Telegraph. The beat to the right is the dash or long mark of the ink-writer—the tap or long

sound of the sounder or the stroke on the right-hand bell of Bright's telegraph.

"The dot-and-dash code as shown on the narrow paper riband of the ink-writer might be set up in type in full-points or hyphens and dashes, so:

.—.	.—	..	—.	—...	———	.——
R	A	I	N	B	O	W

"I am told," said Mr. Carr, "that use is now being made of this dot-and-dash code (which has been known generally as the Morse code) for ship and army signalling by means of flags and other contrivances, where this ordinary electric telegraph is not available.*

Both Mr. Robson and James were much pleased at being able to follow this explanation; but they still thought telegraphy must be a very difficult art.

"And pray," asked Mr. Robson, "can you forward communications from this office to Paris, Brussels, Vienna, or any continental city?"

"Yes; it would be possible to do so," was the reply; "but we are not always able to hold *direct* conversation with those cities from this office, because our wires terminate at the central office in London; and, therefore, we must first telegraph there,—whence the message is re-telegraphed to its destination. But were it not that our own arrangements make this plan preferable, we could, without doubt, 'speak' direct

* See article "Making Telegraphs."—Vol. V.

with the Continent from this room. Very distant cities are sometimes spoken with from London."

"Have you ever sent a telegraphic message to India, without its stopping on the way?" inquired Mr. Robson.

"Oh, yes. I was present on the occasion of an unbroken telegraphic communication being held between England and India by way of Russia. I was shown into a small and rather dark room of a house situated in a narrow court off Moorgate Street, near the Bank of England. A clerk sat before a small apparatus not larger than a writing-desk—of the well-known sort, called the morse or ink-writing telegraph.

"'Call Kurrachee,' said his chief. 'Now Kurrachee is a town in India, many thousand of miles from London.

"'Kurrachee answers,' the clerk replied.

"'Ask what weather they have in the North-West Provinces?'

"Plentiful taps interspersed with ticks speedily answered:

"'Fine, damp, and hot,' read out the London clerk.

"Question and answer had occupied less than *two* minutes."

"Which way did the message go?" asked James.

"From London, through Essex and Suffolk; then under the North Sea, through Germany, Poland, over the Russian Steppes, and, finally, through Persia, I

believe," replied Mr. Carr, "to the little office at Kurrachee, which serves as the key to the great telegraph system of India."

"Truth is certainly at times stranger than fiction," said Mr. Robson. "I think we have fairly outdone the Arabian Nights with their marvels. But at the risk of exhausting your good-nature, let me ask one more question. Can you give us an instance of an unusually rapid transaction of business between merchants by means of the telegraph?"

"Yes," said the superintendent, "I can. A sharebroker in London one day gave in a message at the Central Telegraph Station, at twenty-five minutes past twelve, addressed to his correspondent at Leeds, in Yorkshire, 180 miles distant. The message, instructing the agent to buy several thousand pounds' worth of railway shares, was transmitted to Leeds in three-quarters of a minute; it was delivered instantly to the gentleman for whom it was intended, the shares were bought, and the reply, announcing the completion of the purchase, was telegraphed into London at thirty-one minutes past twelve, in fact, before the ink on the original message paper had become thoroughly dry!"

"Then," said Mr. Robson, "messages have been actually sent over a total distance of 360 miles and several thousand pounds laid out in six minutes?"

"Precisely so. And although this does not occur every day, still it shows what the telegraph can do.

We have received messages from abroad even before the time at which they were stated to have been written. But this, of course, was owing to a difference in the clocks caused by a difference of longitude. Now, I must tell you a very wonderful fact," said the superintendent, "which is of the utmost importance to us. The electricity that conveyed the news that there is a rainbow over York Minster may be said to have performed half its journey *through the earth*, and the other half by wire."

"Is it possible?" cried both Mr. Robson and his son.

"Yes," was the reply; "instead of having in reality one wire to convey the electricity to the distant stations and a separate wire for its return—*i.e.*, two wires for each instrument—we bury the ends of the line wires in the earth at the terminal stations, say, for instance, at London and Liverpool; so that while one wire conveys the electricity in one direction, the earth itself supplies the place of the second wire, thus forming half the circuit. Under the application of this discovery, a signal passing from London to Liverpool along the line wire, *returns to the earth*, and either passes through it to London and *vice versâ*, or, pushing a little electricity into the earth at Liverpool, pushes a little out at London, and so completes the circuit. I did not tell you this at first, because I wished my explanation to be as simple as possible, and even now I

have not used exact scientific language, so that I might not puzzle you."

"But," inquired James, "why do we see so many wires on the telegraph-posts? I counted twenty one day."

"We seldom allow more than six stations to be in communication with one at a time, or else our business would be delayed by several offices wishing to telegraph at once. But," continued Mr. Carr, "there is a great deal yet to be explained respecting the submarine and subterranean telegraphs, and various forms of telegraphic apparatus; and I have a collection of anecdotes to relate that would interest you. But I must reserve these for another day, as the office is about to close. I recollect, however, once saving a woman's life by telegraph, but——"

"Oh! pray tell us that story!" exclaimed James.

"One dark winter's morning," replied the superintendent, "a woman gave her daughter, who was on the point of starting for a distant town by railway, a strong doze of laudanum in mistake for a cordial mixture. Some time after the daughter's departure, the mother, to her horror, found out the mistake she had committed. In her distress some relatives proposed the use of the telegraph. It was then too early to find the office open, and the relations came in the greatest haste and distress to me. Not a moment was to be lost, or the girl's life might pay the penalty.

I came immediately to this office, and ascertained that the train was then in sight of the Swinton Station, on the Midland Railway. I telegraphed instantly to the station-master, describing the girl and explaining the case, and requested him to take the young woman out of the train, and send for a medical man."

"Was she saved?" eagerly asked James.

"Yes," replied Mr. Carr; "the message was just in time. The young woman was found in a most critical state; but by the prompt measures taken by the doctor she was, to the great joy of her mother, restored to consciousness, and she ultimately recovered her usual health."

"Oh!" said James, "how proud you must have felt at having saved her life."

"It was certainly a happy result," said Mr. Carr; "and I felt grateful at having been, in the discharge of my duty, the means, in some degree, of bringing it about."

Mr. Robson thanked the superintendent for the kindness which he had shown in explaining the wonders of his office; and he and his son returned home very much interested and gratified with what they had seen and heard of the Electric Telegraph.

THE BREAD RIOT.

ONCE, when I was a very little girl, about five years old, there was a great strike in our town. There have been so many strikes lately that I think all of you children must know what that means; but in case anyone should not, I will explain that when any body of workpeople, such as builders, or colliers, or weavers join to ask higher wages from their masters, and refuse to do any work until the masters will give them these higher wages, that is called a strike. The colliers have always been very ready to make use of strikes, whenever they have wanted any change made either in their pay or work, and it was a colliers' strike that happened when I was little.

It lasted a very long time, ten or twelve weeks, and caused a great deal of misery; for, of course, when the colliers would not work they could not have any wages,

and there was little money to take home to their wives, and very little food for them and their children to eat. The streets used to be filled all day long with numbers of idle men, who sat on the kerb-stones, or leaned against the walls, or stood about in groups in the wide market-place talking over their grievances, and abusing the masters; until, as the weeks went on, and their little children grew white and thin, and their homes more empty, and their own hunger more keen, they began to think all the world was to blame for the wretched state they were in, and they grumbled not only at the masters, but at all who were better off than themselves. It is very hard for those who are suffering much to be just, and these poor men became very unjust, and fancying that every man's hand was against them, turned their hands against all.

At the time of the strike we were all living in a pretty little white cottage in the country, about three miles out of town. Papa had taken this little house for us children, and it was *our house*. Papa only came to visit us every Saturday and Sunday, and used to live in the large dull town house all the week, because his office was there, and he did not like to be away from the office except on Sundays. So Pansy Cottage was our house. We called it Pansy Cottage because there were so many beautiful pansies in our garden. Mamma had died the year before, when we were all so little we could remember hardly anything about her,

and papa had first sent us to this pretty cottage just after her death. I was four years old then, and I thought nothing could be more delightful than to live in a real cottage. Our house in town was large and dull, built of dark red bricks, with dark oak staircases and floors, and with so many rooms in it that half of them were unused. It stood in the wide, old-fashioned street, with only other red houses before it, and a large flagged court behind, round which were built stables, coach-houses, brew-houses, and laundry. True, there was a strip of bright garden below that, sloping down to the river, with flowers and fruit-trees, and pretty beech-trees whose bough swept over the brown water of the river, but that was some way behind, and the back windows only looked upon the court.

Now, our cottage in the country was white and small, with lattice windows, long and low, outside shutters, flagged floors, and the front door opening right into the tiny parlour. There were only six rooms altogether in it, and we had to have our meals in the kitchen, and make a nursery of the garden. What could be more delightful? Creepers grew over the walls, and you could gather roses from the windows; when the front door was open a great toad who lived under the one white doorstep would walk into the parlour, and every inch of ground beyond the four white walls was full of wonders for us little town children. I do not think I have ever been happier than I was

the first day I spent at Pansy Cottage, and the whole time of our stay there during two summers seems to me now as if it had been a bright pleasant time, in spite of one or two things that were not pleasant. When papa left us on Monday morning to return to work, we were left to spend the rest of the week alone with the nurse and a girl who did all the rough work about the little house. But we never felt lonely, because our cottage was built on to the end of an old-fashioned farmhouse, where lived a large family, and our garden opened on to the farmyard, and nurse knew that if we were ill, or needed help from any cause, the Rimmers (the farmer's name was Rimmer) would be glad to give it.

It was growing late in the autumn, the Keswick apples were all gathered, and the late pear-tree that stood in the middle of the large garden had only one or two pears left on it for papa to gather the next Saturday, when one day Edward and I, being quite alone in the pretty garden, we saw a poor little ragged beggar-boy come through our garden-gate and beg at the kitchen-door. He was soon sent away by nurse, who was not by any means tender-hearted, and we saw that he was crying as he went along. He was a little boy, not much bigger than I was, and he was quite alone, and the town was a long way off. I felt very sorry for him, and said to Ted:—

"Go and tell that little beggar-boy to come here, and

I will give him some pears. Nurse is cross, and won't give him any bread; but I am sure papa would give him some pears."

Ted ran, and by the time he had come back I had gathered two beautiful brown pears, which I gave to the boy. He soon ceased crying, and his black eyes twinkled with pleasure as he eat them, chattering all the time. He was Irish, and quite ready to forget his grief, and be funny and merry as soon as people were kind to him, and we thought him a delightful boy. We walked altogether along the garden-path through the gate, and across the wide farmyard, until we had started the poor little fellow fairly on his way home along the dusty high road; and as we went he told us his name, and where he lived, and we began to feel a kind of property in him, and when he had gone we called him "our little beggar-boy," and hoped he would come again some day. But when we went in nurse gave us a great scolding; she had seen us go across the yard with the ragged little fellow, and made us tell her all that had passed between us and the boy. When she heard about the pears she was very angry, and said she should tell papa of our stealing his fruit. This made me very unhappy, and though I had not thought I was stealing the pears at the time I took them, I began to feel afraid to tell papa what I had done, and dreaded his visit on Saturday. But I could not be sorry that "our little beggar-boy" had

enjoyed them, and I felt sure that if papa had seen him he would have given them to him.

Well, some days after this nurse said she would take us to spend the morning in the High-field, a hilly pasture with a deep railway cutting running through it, and we were all of us so fond of watching the trains that we were very glad to get ready to go with her. Baby and Tom were placed in their little brown wooden carriage, which nurse pulled along; it was not like a perambulator which a nurse pushes before her—it was drawn by a long handle, and nurse went first, and then came the carriage; and when both the little ones were in it, either Ted or I pushed behind.

In this way we reached the High-field, and had just caught sight of the railway, when a train came in sight. Nurse took baby in her arms to let him see, and Tom climbed on to the seat of the carriage, and stood there clapping his hands. When the train had gone by baby was put back into his seat, and little Tom was told to sit down, and then, without waiting to see her order obeyed, nurse drew on the carriage. Poor little Tom, however, had not sat down as he was told, and directly the carriage moved he tottered, lost his balance, and fell over the back, coming down heavily on his left arm. Of course, he cried, and nurse was frightened and then angry. You must have found out by this time that she was not either a very careful or a very kind person. She picked the little fellow up, and

looked him all over; and when she found there was nothing amiss to be seen, told him to stop crying directly. But poor little Tom still cried on, and when she lifted him up to place him once more in the carriage, he screamed violently. This made nurse so angry that she shook him, telling him he was a very naughty boy; and if he did not stop crying directly, she would take us all home, and we should see no more trains. But threats were of no use; he screamed louder than ever for a moment or two, and then the screams changed into a low wail, with a little sob now and then when the ground was especially uneven, and the carriage jolted over the sods, so it was no use for us to stay any longer. Tom was an especial pet of mine, and I had no heart for trains while he was unhappy and nurse was cross; and baby soon found out all was wrong, and began to cry too; so I think we were all glad when we turned towards home. Home, however, did Tom no good; his piteous little cry went on and on, and never stopped either for our kisses or nurse's scoldings, till she became really frightened.

I have told you that Papa usually came to see us only once a week, on a Saturday; but this Thursday afternoon, when we were in the midst of all our trouble, he came. I had climbed up into my favourite resting-place, the broad ledge of the lattice window of the kitchen. This window was long and rather low,

with tiny square panes of glass, and it looked on to a great bed of old-fashioned blue forget-me-nots, and in the Midsummer weather I used to think that it must be the loveliest of all flowers, as I looked down at the little island of blue stars. And then, when they were over, came clove-carnations, and honeysuckles which climbed all round the window, and lavender; and if I looked over the flower-bed, and through the white palings, I could see all that went on in the farm-yard, and everyone who came in at the great gate leading from the high road. Whenever nurse was especially cross upstairs, and I could get away, I found my way into the kitchen, climbed the broad white dresser, and found peace and happiness in my window-seat.

And now while I was lying here watching the men in the great barn, and wishing, oh! so very much, that little Tom would stop crying, I saw papa come through the great gates, walking hurriedly. In a moment I was off the dresser, through the open door, and by papa's side, with my little hand in his, telling him the great adventure of the day—Tom's fall in the High-field. Papa walked straight into the kitchen. He did not seem to listen to me, and looked tired and cross I thought; but now I know he was anxious and worried; for he had come to tell us that there was a riot in the town, and that he feared that the rioters might come to our little cottage to take what they could find. And so he had left his office and

walked here to make us lock our doors and close our shutters, so that the house should look as if there was no one in it, hoping by this means to make the rioters pass it by as not likely to yield much plunder. I listened as he told nurse and Ann that there were thousands of men now marching all through the town, calling for bread, and stopping at every baker's shop and every provision shop, to smash shutters and windows and seize every loaf and ham and cheese they could find. They were the colliers who were out on strike; they were weary of hunger and idleness, and full of envy for those better off than themselves. They had listened, too, to men who had made grand speeches to them about what they ought to have and how they were defrauded of their rights; and, growing impatient of suffering to which they saw no end, and without at first intending much mischief, they had gone to the largest baker in the town to ask him to give them bread, bread not for themselves, but for their little children and wives, who were starving at home. The baker refused, and someone in the crowd threw a stone at the windows of the shop, crying out: "Then if you will not give we must take!" It was the easy beginning of a great deal of harm. The rest caught up stones and sticks, and before many minutes had gone by the whole of the shop-front was destroyed, and every loaf in it was in the hands of the rioters. And from this shop they went on to others, and then

to the houses of the rich people living in town, saying they must have bread, and when the people saw the number of angry shouting men, they all gave what they could—bread or meat or money—while the more they got the more the men asked for, with angry threats.

Soon people began to say that when the mob had got all they could in the town they would go to the houses standing alone in the country and plunder them. Papa thought of us, and knew how frightened we should be if the rough, angry mob came to our little cottage, and so he set off at once to come to us to give us what protection he could, and arrange how best to prepare for them. I listened to all this at the time without understanding more than that there was something frightening going to happen, and while I listened I nearly forgot Tom and his fall; but all the time papa was talking the little wailing cry could be heard, and at last he stopped to ask:

"What is the matter with Tom?"

"Oh, nothing, Sir," answered nurse; "he had a little tumble to-day, and he has been cross ever since."

Papa did not wait to hear more, but ran upstairs quickly to the nursery, and, taking the poor little fellow in his arms, tenderly questioned him, and examined each of his limbs. He soon found the tiny left arm hung helpless at his side, the collar-bone was broken! I think poor papa must have felt sadly

puzzled what to do when he found this out. The poor little bone must be set, and set at once, for already it had been neglected too long; the town was three miles off, and to carry Tom there and back—for there was no carriage of any kind to be had near us—and to have the bone set would take more than two hours, and in that time the rioters might be upon us. I should not like to decide in such a case. But papa's mind was soon made up. He must have the bone set without delay. So he first himself closed all the outside shutters of the cottage and barred and locked the front door; then wrapping Tom up in a warm, soft shawl, he set off to the surgeon's house, telling the servants on no account to open the door of our cottage or any of the shutters, but to remain quiet, and to keep us children quiet in a room upstairs whatever might happen. I felt frightened enough when first he left us, for I saw how terrified nurse and Ann looked, and I knew that it must be something very strange that should make papa put us all in the dark while the sun was still shining; but I think, when we were once more safe back in the nursery, with a candle and our toys, I must soon have forgotten my fears, for I do not remember in the least how we passed the time till his return. But the rioters did not come.

About four o'clock papa came back, still carrying my little brother in his arms; but he was no longer wailing piteously, but lay fast asleep, looking pale but

quite comfortable, and the poor little arm was safely bandaged and sure to do well. What papa said then to nurse I do not know; but I do know that she was sent away very soon after this, and we children always believed it was because she had been so cruel to Tom.

Four o'clock was tea-time for us children, and we always had all our meals in the kitchen, except when papa was at the cottage, and then Edward and I, the two eldest had them with him in the tiny parlour. But this day papa said he would have tea with us in the kitchen, so that we might all be together, and also because in that room there was a fire, and we could manage without burning a candle, and so would be less likely to be noticed by the rioters if they came our way. For though the outside black wooden shutters were all closed, they did not fit well, and a bright light would show itself through many a chink and cranny to those outside. So there we sat in the gloom round the little tea-table hardly daring to speak above a whisper; it all looked so strange.

We were in the midst of our tea when we began to hear a great roar, faint at first, but soon growing more loud and near, a sound of many voices and of many feet, and we knew the mob was coming at last. I began to cry, so did Ted, and I think the maids would have cried too, had not papa told them sharply to be quiet. He was listening, trying to distinguish which

way the people were going, and soon he turned round, looking much happier than he had done before on that day, and said—

"They are going farther on; they are passing the great gates without turning in."

Just as he said this there came hurried steps up the garden path, and a hurried, loud knock at the kitchen-door. No one moved or spoke, for papa made a sign we should keep quiet; then came a louder knock, and then we heard someone striking the shutters of my favourite window, as if determined to break them in. Then papa got up, and called out:

"Who's there; what do you want?"

"Bread! bread!" shouted back someone, "and we must have it!"

"Wait a moment," said Papa; "I will open the window."

And he did so, unfastening the shutters and looking out. Two men stood there, not very bad-looking men, but thin, pale, careworn and excited, with ragged clothes and very dusty feet, feet which were treading down my dear forget-me-not plants, and eyes which looked in upon us suspiciously and greedily. There was not much to see, a very plain cottage kitchen, some frightened women and children, and half a loaf of bread on the table by the teacups.

"What do you want here?" again asked papa.

He stood a little to one side in the shadow, and I

think that the men thought it was a poor man's cottage they had come to, a man perhaps not so very much better off than themselves. At any rate, they answered more quietly.

"We are starving; give us bread for our wives and children."

Papa took two or three shillings out of his pocket, and held them out to the men, saying:

"Nay, you would not take the bread from my children. That is all we have in the house, and if you take it we can get no more to-day."

"No, no!" said the two together, while one of them added, "We doan't wish for to starve other folk as well as oursens. Good-night!" and they were gone as suddenly as they had come.

For some time we could hardly believe that they were gone. We had felt so frightened, and so sure that something dreadful was going to happen, that we could not believe that all the danger was over. But it was so. The two men ran across the garden, jumped the fence and the farm-yard gate, and we could see them no longer, while the sound of angry voices and heavy wooden shoes grew less every moment. Papa looked happy again, and said that he would go out and see if all the mob had passed. They had; by the time he reached the great gate there was not a creature to be seen along the white dusty road, and the sound of their voices came faintly from over the hill on the way

to S——, the nearest village. When he came back he said we might open the shutters and enjoy the sunshine, and even go into the garden, and we felt like prisoners released.

One of the farmer's sons came in soon after. He had been to the town on business, and there he had found that the riot had so completely upset the people that he could neither do the business he had gone upon nor return home, as the mob had taken our road and forced all the peaceable people they met to join them. So he had waited, and then followed them at some distance. He brought news that the soldiers had been sent for by the mayor early in the afternoon and were expected every moment to arrive by train when he left the town. There were no telegraphs in those days; but there was a railway to the nearest town where soldiers were stationed, and the messenger had been sent on a pilot-engine, so that no time had been lost. But the town was fifteen miles away, and a body of soldiers must take some time to get ready and come that distance even by train.

Ned Rimmer had hardly told us this, and we were all standing in a group in the farm-yard listening to him and the other farm-people as they told tales of what this mob had done, and other mobs before it, in our old town, when suddenly we again heard the shouts and cries and heavy wooden clogs of the rioters, and soon could see them rushing down the hill on the

S—— road; shouting, screaming, running with headlong speed—men and boys, some few women, and even children—clambering over hedges, stiles, and gates on each side of the road, and all crying at the top of their voices, "The soldiers! the soldiers!"

It would be difficult to make you understand the confusion and terror they were in; they tore down some palings in one place, and some fifty of them rushed through the opening and ran across the field; in another place, just opposite our farm-yard, where there were two gates side by side leading into two pastures, some of them threw one flat to the ground, and leapt over it, and then, stooping behind the hedge so that they might not be seen, ran along it; while others clambered over the next gate and disappeared in a little copse close by, and everyone seemed to us to be so frightened that they hardly knew what they were doing.

In the midst of all this, all at once I saw "our little beggar boy" standing by our gate, trying to lift the heavy latch. He looked more wretched than ever; he was crying bitterly, and his poor little feet were all bleeding and covered with grey dust. As soon as I saw him I darted towards the gate, and papa followed me calling sharply, "Come back, Annie, you will be hurt! What are you thinking of?"

"It is our little beggar boy" was my only answer, as I tried to pull the gate open.

Papa was by my side now, and he soon opened it, saying:

"Do you want this lad to come in? Poor fellow! he does not look much like a rioter. Come into the yard, and you shall stay here till all the crowd has gone."

So he came in, and stood by us on the hillock; and he told us, between his sobs, that his father was among the riotors, and that he had followed him from the town, thinking that it was only fun, and that he had liked it very much until they were close upon the village of S——, when the leaders of the mob were met by a small party of colliers who told them that the soldiers, instead of going to the town as everyone expected, had alighted from the train at S—— station and were now within a quarter of a mile. A sudden panic seized the whole mass of people, and in their mad effort to get away, "our little beggar boy" had been thrown down and his foot trodden on; but he scrambled up and had managed to limp as far as our gate, and then stopped, in the hope, I thought, of seeing me. He had no idea where his father was; but that did not seem to trouble him, if he could only rest for a little time and might wait till the soldiers had gone by, he could soon find his way home.

I believe he expected the soldiers to fire on him, poor little mite! as a rioter, and trembled with terror as he spoke of them.

Papa told Ann to take him in and to give him some

bread and butter and milk, and then to make him bathe his feet at the pump, while Nurse looked for a pair of my old shoes for him to walk home in.

By this time the mob had entirely disappeared. The dusk was coming on, and this helped the people in their escape; and before we left the farm-yard not a soul could be seen along the white road nor in any of the fields.

Three times in my life I have seen soldiers in pursuit of a mob, and each time the sight of them has made me feel frightened and inclined to cry. Partly, I think, because a large body of men, several hundreds most likely, are all acting as one man, and this gives the looker-on the feeling of great strength and power; the hundreds of feet which move as one foot; the hundreds of guns which will be fired together, as if there was only one mind to direct, and one arm to hold, and one hand to pull the trigger, make you feel that no force can stand against them, and that they can do anything they choose no one having the strength to prevent them. Especially you feel this, when the soldiers come after a frightened, rushing mob, in which each man is thinking only of himself and has not a thought to spare for anyone else, when he blindly rushes on without having even courage to stop to make up his mind as to the best thing to do, and dashing here and there as his fears drive him.

The old proverb says "Union is strength"; and even

when I was a little girl I felt this, without knowing exactly what it was I felt. This time the soldiers came down the hill in lines which stretched from hedge to hedge, and if there had been anything or any person in their way they must have swept it before them; but nothing was there, and it almost seemed as if they had come too late to be of any use. But it was not so. Without them, our old town would have been at the mercy of the mob, and the people would have gone on from bad to worse, while their presence, even at some distance, had been enough to restore order. They passed us standing on our hillock; we watched them disappear over the railway-bridge on their way to the town, and we heard afterwards that when they reached it not a single rioter was to be seen; the vast crowd had melted away like snow in sunshine, and the soldiers quietly took up their abode in W——, with nothing to do but to look fierce.

As soon as they were past the farm our little beggar boy bade us good-night and followed them at a very respectful distance. We never saw him again.

That evening papa took me and Ted to his own room to look at poor little Tom lying with a pretty flushed face and bandaged arm in a cot that had been placed by the side of papa's bed, for he would not trust Nurse with him that night. Then he kissed us and sent us to bed; and that is the end of my story about the Bread Riot.

ARTHUR'S BOX OF INSECTS.

"AUNT MARY," said Arthur Burton, coming into the parlour with a deal box under his arm, "have you time to look at the insects that mamma has sent me from India? I want you to tell me what you know about them. They are so curious. One looks just like a bit of dry stick."

"Yes," replied his aunt. "We can have a talk about the insects now. But run and fetch Jane; she will like to join us."

Arthur fetched his sister. Then he placed his insect-box upon a little table by his aunt, and he and Jane came and stood close beside her.

"I have been reading," said Aunt Mary, "your brother Fred's account of the strange colours and shapes of certain animals and insects. He has been writing a paper for the Natural History Society of his school, which he calls 'The Protective Colouring and

Form of Animals.' I do not think you would be able to understand it all, but I will tell you a little about it. Fortunately he speaks of your stick-insect, Arthur. I shall come to that presently.

"Most animals need some means of concealing themselves from their enemies. Some animals, like the mole, can burrow in the ground and hide themselves that way; others, like the bat, come out only after daylight, when the darkness hides them. But there is another means of concealment, which is in the colour of the animal itself. Its colour is the same as the ground on which the creature lives, or the foliage of the trees that surround it. Thus it can move about unperceived by its enemies.

"I will give you an instance to explain my meaning. You remember how you admired the pretty green paroquets the other day at the Zoological Gardens? Well, they live in tropical countries where the trees are green all the year round. Their green colour therefore conceals them capitally. But here in England, where the trees shed their leaves every autumn, the birds are of a quiet brown colour, with only slight variations of tint."

"Oh, yes, Aunt, I know that," cried Jane; "it is often difficult to find out where a bird is, even if it is singing up in a tree close at hand."

"That is because the bird is just the same colour as the bough on which it is sitting. Now a great many

of the insects have not only the same *colour* as their surroundings, but have the *form* also of the thing upon which they are resting. It is so with your stick-insect, Arthur."

"Then does the stick-insect live amongst dead twigs, Aunt?" asked Arthur.



"Yes; it is always found amongst them, and it never rests on fresh green leaves, where it would be

conspicuous. The little creature itself imitates the form of dead sticks still further, for it always hangs from twigs with its legs extended at uneven distances.

"Sometimes the stick-insects are covered with a curious growth that looks exactly like the lichen you have seen upon real twigs."

"How strange, Aunt," cried Arthur. "I think it is a very good thing that they are so well hidden from their enemies, for I don't see how they could defend themselves if they were attacked. They have no sting, I suppose, like wasps?"

"No, the stick-insect is quite powerless to defend itself from its enemies, the birds, snakes, and monkeys that prey upon it, so that its deceptive appearance is its only protection. There is an Indian butterfly, called the leaf-butterfly, which is as curious as the stick-insect. Here is a picture of it," continued Aunt Mary. "It forms one of the illustrations to Fred's paper.

"You see the butterfly in two positions; first with its wings open flying, and secondly with its wings closed resting upon a spray."

"But I can't see it resting, Aunt," said Jane. "Surely those are only leaves on the spray?"

"No; the lower one of them is the butterfly. But I don't wonder that you mistook it for a leaf, for in that position it looks exactly like one. The under surface of the wings are of a dull shade of yellow or brown, and they have marks on them, just like the

ribs and veins of a leaf. When the butterfly settles, it attaches itself to a twig by its middle pair of legs, whilst its body, head, and antenæ are concealed by its wings which are closed. The hind wings, as you see in



the picture, are pointed. When the wings are closed these points come together, and, touching the twig, they look exactly like the little stalk of a leaf. Then to make the creature still more like a dead leaf, it has

often dark patches of colour on it that resemble mould or mildew."

"How different the butterfly looks with its wings open!" remarked Arthur. "It seems to be quite brightly coloured on the upper surface."

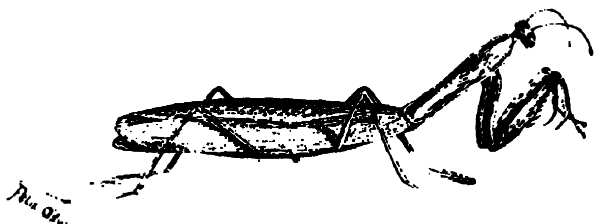
"Yes; it is blue with a bright yellow band across. But these colours, which make the butterfly conspicuous, are not a disadvantage to it. They are only exposed to view when the creature is flying, and it flies so swiftly that it cannot be easily caught. When the butterfly settles on a twig, it remains perfectly still with its wings closed, as you see it in the picture. It always rests in bushes of dead leaves, and is never seen upon flowers or in fresh green foliage.

"Caterpillars very much resemble the leaves and twigs upon which they feed. I think you must have noticed that."

"Oh, yes! We were taking some caterpillars off the rose-trees yesterday evening, and it was quite difficult to find them, because they were just the same colour as the rose-leaves. And I remember, Aunt, you showed me once a picture of the Emperor Moth caterpillar. It was green, with pink spots on it, and you told me that it fed among pink heather. So it must have been just the same colour as the flowers and the leaves of the heather."

"That is a good instance," said Aunt Mary. "I am glad you have remembered it."

"What is this insect, Aunt?" asked Jane, pointing to one in the box, that looked something like a large grasshopper.



"That is a mantis. It also is protected by its colour, which varies according to its surroundings. Some kinds, that are found amongst dead leaves, or on the bark of trees, are of a greyish brown colour, whilst others, that live in fresh green foliage, are bright green. The green mantis are abundant in Egypt. I recollect being rather startled by the first one that I saw when I was staying in Egypt. I was picking a spray of green leaves from one of the small trees in our garden, when suddenly I saw a large green creature on my hand. I had not observed it amongst the leaves, as it had been completely concealed by its green colour. I shook it off, fearing it might sting me. But I learnt afterwards that the mantis does not sting. The name *mantis* means prophet. You see what curious long front legs it has?

Well, it moves them about in a very strange way whilst the rest of its body remains perfectly still. On this account people used to suppose that it was prophesying future events. In Egypt it is called the Praying Mantis. The Mahomedans, when they pray, wave about their arms in the air, and as the mantis waves its front legs somewhat in the same way, they have given it that name. Cuvier says that the Hottentots have the highest veneration for the mantis, and if it happen to alight on any person, he is considered by them as the peculiar favourite of heaven, and ever afterwards holds the rank of a saint. I was not aware, at the time, of my good fortune.

"These insects, however, are very unsaint-like in nature. They will kill and eat one another without being impelled to do so by hunger. A naturalist, who had observed them when fighting, says: 'Their manœuvres very much resemble those of hussars fighting with sabres. Sometimes one cleaves the other through at a single stroke, or severs its head from its body. When the battle is over, the conqueror devours his antagonist.'"

"What strange creatures!" exclaimed the children.

"They are, indeed; and it is said that even the young ones that have just come out of the eggs, will attack each other fiercely!"

"I remember, Aunt," said Jane, "that cousin

Annie told me she had seen a mantis in the south of France. She told me, too, that she had seen little green frogs there that live up in the trees. I suppose their green colour hides them capitally amongst the green leaves."

"Yes. It is not at all easy to find them on that account. The common English frog, on the other hand, is of a very different colour, as you know. Its colour is mottled buff and brown, which is just the same as that of the ground it inhabits, so that the colour of each kind of frog conceals it in its different situation. The English frog possesses a further power of protection. It can change its colour, to a certain extent, something like the cameleon. Its body is covered with little cells, which it can open and shut, and by doing so change its colour. You can prove this by putting a frog into a dark box, and then placing it on a sheet of white paper. You will soon see that it becomes considerably lighter in colour. But remember if you try this experiment, to handle the frog very gently or you will hurt it, and be sure to let it go as soon as possible."

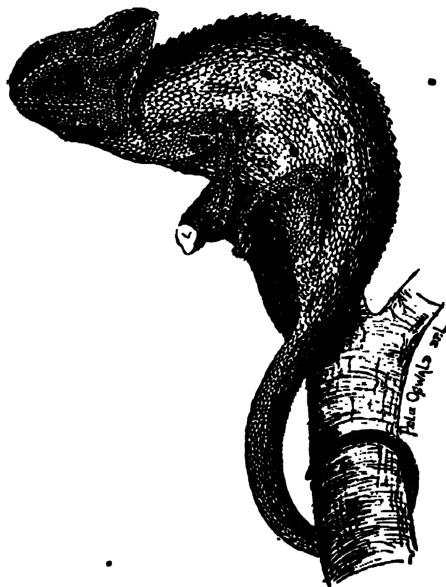
"I should like very much to see a frog change colour," said Arthur, "and I promise you that I will be very careful not to hurt it."

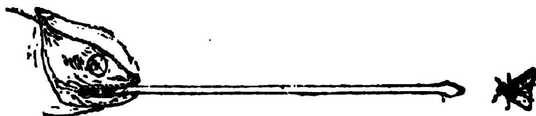
"Did you ever see a cameleon, Aunt?" asked Jane.

"Yes, I once had one for a pet. That was when I

was visiting your father and mother in Egypt. I will tell you about it.

"One day we were walking across a part of the desert when we saw a very curious little animal, crawling along on the sand. I turned my parasol upside





down and induced the little creature to walk into it, and by this means we brought it home. We found on inquiry that it was a cameleon. Here is a picture of one," continued Aunt Mary, opening a book which lay on the table.

"The cameleon, as you see by its form, is a kind of lizard. It is provided with no means of defence of any kind, and can only move along very slowly. It would, therefore, fall an easy prey to its enemies if it had not some special means of protection. But this it has, in the power of changing its colour to resemble the particular surface upon which it is resting. It can thus hide itself most effectually.

"We often observed our cameleon change its colour. When it was upon fresh green leaves it was bright green, when upon sand it was of a sandy colour, and when placed on a piece of black cloth, it was very dark, indeed almost black. You see by the picture that the cameleon has a very short neck. It is so short that the head cannot be turned from side to side as we turn our heads. But to compensate for this the cameleon has large prominent eyes, which move independently of one another, so that they can look in two directions at once. Its feet have five long toes, like fingers, with which it grasps the twigs of trees, and it can grasp them also with its tail. We noticed that our cameleon would hang by its tail when moving from one twig to another."

"What does the cameleon feed upon?" asked Arthur.

"It feeds upon flies and other insects," answered his aunt. "We used to have a large vase of flowers standing in the middle of our table in the drawing-room. The cameleon would sit on one of the sprays of fern or flowers, and wait there patiently for flies. Its body would remain quite immovable, one eye would be directed forwards, looking out for flies, whilst the other was directed backwards, and seemed to be on the watch for any signs of danger. If we came near to the table or made any noise, this second eye would be turned on us at once. When a fly settled on a leaf near to him, the cameleon would dart out his long tongue and seize it. The tongue of the cameleon, when stretched out, is nearly as long as its body, and it has a gummy substance at the end, which makes it stick to its prey. Sometimes, just as the cameleon was going to seize a fly, the fly would escape, and then the force of darting out his long tongue would overbalance the cameleon, and he would roll head over heels on to the table. However, he would soon climb up on to his old perch and begin again to look out for flies. He could not escape, as he was unable to leap off the table or to climb down its polished surface; but he seemed quite content to remain with us. He never attempted to bite or scratch us when we took him in our hands. At night we used

to put him into a small box that stood on our verandah. We kept our cameleon for a fortnight, and then one morning, whilst he was still in his box, someone removed the lid by mistake, and when we came to look for him he was gone."

"How I should like to have a cameleon!" exclaimed Jane. "Can they live in this country?"

"Not for any length of time. Our climate is too cold for them. There are, however, some just now in the Reptile House of the Zoological Gardens, and perhaps they may live longer than their predecessors.

"Cuvier mentions a curious fact about the cameleon. He says that it can go for a very long time without food. It has also a strange power of inflating its body with air. These peculiarities caused a belief among the ancient Egyptians that it lived upon air. Of course, this was not true; but experiments have proved that the cameleon can live for four months without any food!"

"How strange!" said Arthur. "I don't wonder that people thought it lived upon air."

"Does the cameleon lay eggs?" inquired Jane.

"Yes; the female lays about a dozen eggs at a time, which she deposits in the sand. The warmth of the sun causes them to be hatched."

At this moment the door opened and little Marian ran into the room, calling out, "Tea is ready; all come to tea."

"Oh! Aunt," cried Arthur, "I had a great deal more to ask you about."

"Never mind," said his aunt, "we will have some more talk about the insects another time. Now we must go to tea."

Arthur shut up his box of insects, put it carefully away into a cabinet, and then followed the others into the dining-room.

CHRISTMAS VERSES.

Who deserves a merry Christmas?
  Boys and girls exclaim, "We do!"
I will tell you who deserve it,
      'Tis the Lifeboat crew.

Last night, when you and I were sleeping,
  They went bravely through
Roaring winds and waves and midnight.
      Glorious Lifeboat crew!

And they rescued from the shipwreck
  Every man and woman, too;
We 'd like to have such joy to day
      As yours, O Lifeboat crew!

END OF VOL. VI.

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